

Pioneer *sound.vision.soul*

Service Manual

ORDER NO.
CRT4084

CD RECEIVER

DEH-2000MP /XS/UC



This service manual should be used together with the following manual(s) listed below.
For the parts numbers, adjustments, etc. which are not shown in this manual,
refer to the following manual(s).

Model No.	Order No.	Mech. Module	Remarks
DEH-2050MP/XN/ES	CRT4044		
CX-3195	CRT3815	S10.5COMP2	CD Mech.Module : Circuit Descriptions, Mech. Descriptions, Disassembly

1 2 3 4

SAFTY INFORMATION

WARNING

A This product contains lead in solder and certain electrical parts contain chemicals which are known to the state of California to cause cancer, birth defects or other reproductive harm.
Health & Safety Code Section 25249.6 - Proposition 65

EXPLODED VIEWS AND PARTS LIST PACKING(Page 26)

PACKING SECTION PARTS LIST

*:Non spare part

B

Mark	No.	Description	DEH-2050MP/XN/ES	DEH-2000MP/XS/UC
	2	Accessory Assy	CEA6708	* YEA5029
	3	Screw	Not used	BPZ20P060FTC
	12	Polyethylene Bag	CEG1373	CEG1374
	13	Unit Box	YHG5313	YHG5338
	14	Contain Box	YHL5313	YHL5338
	15	Protector	YHP5039	YHP5041
	16	Protector	YHP5040	YHP5042
C	17-1	Installation Manual	YRD5147	Not used
	17-2	Owner's Manual	YRD5145	YRD5144
	* 17-4	Warranty Card	Not used	CRY1246
	18	Case Assy	YXB5009	Not used

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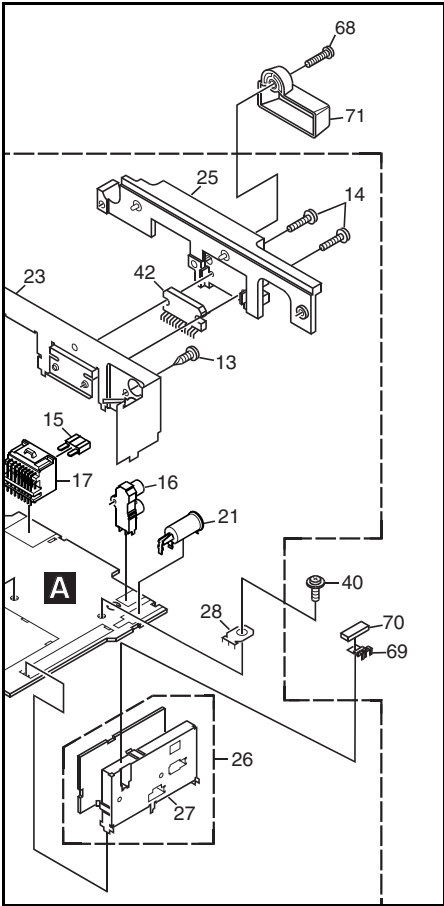
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EXTERIOR(Page 28)

EXTERIOR SECTION PARTS LIST

Mark	No.	Description	DEH-2050MP/XN/ES	DEH-2000MP/XS/UC
	11	Tuner Amp Unit	YWM5234	YWM5232(Tuner Amp Assy)
	44	Grille Assy	YXA5374	YXA5319(Detachable Assy)
	45	Grille Unit	YXA5334	YXA5302
	46	Knob Unit	YXC5072	Not used
	68	Screw	Not used	BMZ40P140FTC
	69	Earth Plate	Not used	CNC8915
	70	Cushion	Not used	CNM8890
	71	Holder	Not used	CNV7619



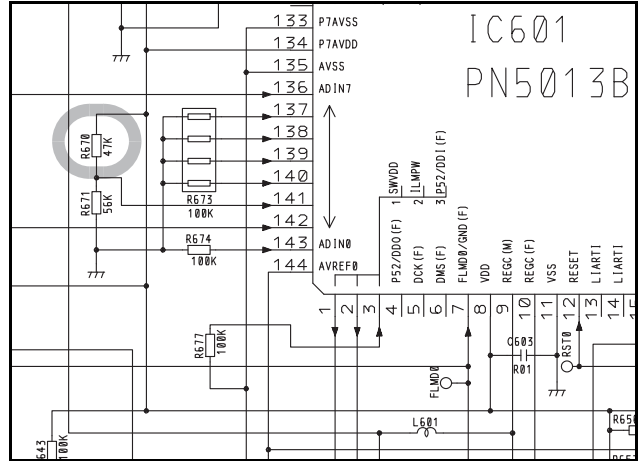
1 2 3 4

ELECTRICAL PARTS LIST(Page 52)

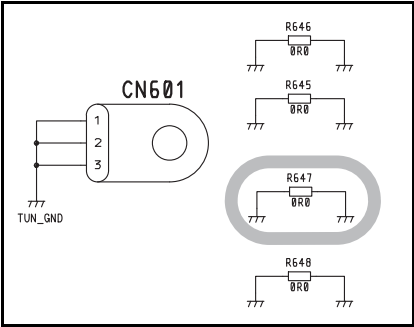
TUNER AMP UNIT

Circuit Symbol and No.	Part Name	DEH-2050MP/XN/ES	DEH-2000MP/XS/UC
R644		RS1/16S0R0J	Not used
R645		RS1/16S0R0J	Not used
R646		RS1/16S0R0J	Not used
R647		Not used	RS1/16S0R0J
R648		RS1/16S0R0J	Not used
R670		Not used	RS1/16S473J
R671		RS1/16S473J	RS1/16S563J
C406		CCSRCH390J50	Not used
C409		CCSRCH100D50	Not used
C637		CKSRYB103K50	Not used
C646		CKSRYB103K50	Not used

Page 37 Address 6D



Page 34 Address 4E



KEYBOARD UNIT

Circuit Symbol and No.	Part Name	DEH-2050MP/XN/ES	DEH-2000MP/XS/UC
D1803	LED	CL-195SR-CD	CL-195PG-CD
D1805	LED	CL-195SR-CD	CL-195PG-CD
D1806	LED	CL-195SR-CD	CL-195PG-CD
D1807	LED	CL-195SR-CD	CL-195PG-CD
D1808	LED	CL-195SR-CD	CL-195PG-CD
D1809	LED	CL-195SR-CD	CL-195PG-CD
D1810	LED	CL-195SR-CD	CL-195PG-CD
D1811	LED	CL-195SR-CD	CL-195PG-CD
D1812	LED	CL-195SR-CD	CL-195PG-CD
D1813	LED	CL-195SR-CD	CL-195PG-CD
D1814	LED	CL-195SR-CD	CL-195PG-CD
D1815	LED	CL-195SR-CD	CL-195PG-CD
D1816	LED	CL-195SR-CD	CL-195PG-CD
D1817	LED	CL-195SR-CD	CL-195PG-CD
D1818	LED	CL-195SR-CD	CL-195PG-CD
D1819	LED	CL-195SR-CD	CL-195PG-CD
D1821	LED	CL-195SR-CD	CL-195PG-CD
R1803		RS1/4SA821J	RS1/4SA561J
R1804		RS1/4SA821J	RS1/4SA561J
R1805		RS1/4SA821J	RS1/4SA561J
R1806		RS1/4SA681J	RS1/4SA391J
R1807		RS1/4SA681J	RS1/4SA391J

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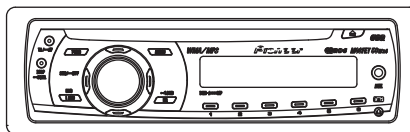
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Service Manual



DEH-2050MP/XN/ES

ORDER NO.
CRT4044

CD RECEIVER

DEH-2050MP /XN/ES

DEH-2050MPG /XN/ES

DEH-2050MPG /XN/ES1

This service manual should be used together with the following manual(s):

Model No.	Order No.	Mech.Module	Remarks
CX-3195	CRT3815	S10.5COMP2	CD Mech. Module : Circuit Descriptions, Mech. Descriptions, Disassembly



For details, refer to "Important Check Points for Good Servicing".

SAFETY INFORMATION

This service manual is intended for qualified service technicians; it is not meant for the casual do-it-yourselfer. Qualified technicians have the necessary test equipment and tools, and have been trained to properly and safely repair complex products such as those covered by this manual. Improperly performed repairs can adversely affect the safety and reliability of the product and may void the warranty. If you are not qualified to perform the repair of this product properly and safely, you should not risk trying to do so and refer the repair to a qualified service technician.

● Safety Precautions for those who Service this Unit.

- When checking or adjusting the emitting power of the laser diode exercise caution in order to get safe, reliable results.

Caution:

1. During repair or tests, minimum distance of 13 cm from the focus lens must be kept.
2. During repair or tests, do not view laser beam for 10 seconds or longer.

CAUTION

Danger of explosion if battery is incorrectly replaced.

Replaced only with the same or equivalent type recommended by the manufacture.

Discord used batteries according to the manufacture's instructions.

[Important Check Points for Good Servicing]

In this manual, procedures that must be performed during repairs are marked with the below symbol. Please be sure to confirm and follow these procedures.

1. Product safety



Please conform to product regulations (such as safety and radiation regulations), and maintain a safe servicing environment by following the safety instructions described in this manual.

- ① Use specified parts for repair.

Use genuine parts. Be sure to use important parts for safety.

- ② Do not perform modifications without proper instructions.

Please follow the specified safety methods when modification(addition/change of parts) is required due to interferences such as radio/TV interference and foreign noise.

- ③ Make sure the soldering of repaired locations is properly performed.

When you solder while repairing, please be sure that there are no cold solder and other debris. Soldering should be finished with the proper quantity. (Refer to the example)

- ④ Make sure the screws are tightly fastened.

Please be sure that all screws are fastened, and that there are no loose screws.

- ⑤ Make sure each connectors are correctly inserted.

Please be sure that all connectors are inserted, and that there are no imperfect insertion.

- ⑥ Make sure the wiring cables are set to their original state.

Please replace the wiring and cables to the original state after repairs. In addition, be sure that there are no pinched wires, etc.

- ⑦ Make sure screws and soldering scraps do not remain inside the product.

Please check that neither solder debris nor screws remain inside the product.

- ⑧ There should be no semi-broken wires, scratches, melting, etc. on the coating of the power cord.

Damaged power cords may lead to fire accidents, so please be sure that there are no damages. If you find a damaged power cord, please exchange it with a suitable one.

- ⑨ There should be no spark traces or similar marks on the power plug.

When spark traces or similar marks are found on the power supply plug, please check the connection and advise on secure connections and suitable usage. Please exchange the power cord if necessary.

- ⑩ Safe environment should be secured during servicing.

When you perform repairs, please pay attention to static electricity, furniture, household articles, etc. in order to prevent injuries. Please pay attention to your surroundings and repair safely.

2. Adjustments



To keep the original performance of the products, optimum adjustments and confirmation of characteristics within specification. Adjustments should be performed in accordance with the procedures/instructions described in this manual.

3. Lubricants, Glues, and Replacement parts



Use grease and adhesives that are equal to the specified substance. Make sure the proper amount is applied.

4. Cleaning



For parts that require cleaning, such as optical pickups, tape deck heads, lenses and mirrors used in projection monitors, proper cleaning should be performed to restore their performances.

5. Shipping mode and Shipping screws



To protect products from damages or failures during transit, the shipping mode should be set or the shipping screws should be installed before shipment. Please be sure to follow this method especially if it is specified in this manual.

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1. SERVICE PRECAUTIONS

1.1 SERVICE PRECAUTIONS

● Service Precaution



1. You should conform to the regulations governing the product (safety, radio and noise, and other regulations), and should keep the safety during servicing by following the safety instructions described in this manual.
2. Before disassembling the unit, be sure to turn off the power. Unplugging and plugging the connectors during power-on mode may damage the ICs inside the unit.
3. To protect the pickup unit from electrostatic discharge during servicing, take an appropriate treatment (shorting-solder) by referring to "the DISASSEMBLY".
4. After replacing the pickup unit, be sure to check the grating.
5. Be careful in handling ICs. Some ICs such as MOS type are so fragile that they can be damaged by electrostatic induction.

1.2 NOTES ON SOLDERING

- For environmental protection, lead-free solder is used on the printed circuit boards mounted in this unit.
Be sure to use lead-free solder and a soldering iron that can meet specifications for use with lead-free solders for repairs accompanied by reworking of soldering.
- Compared with conventional eutectic solders, lead-free solders have higher melting points, by approximately 40° C.
Therefore, for lead-free soldering, the tip temperature of a soldering iron must be set to around 373° C in general, although the temperature depends on the heat capacity of the PC board on which reworking is required and the weight of the tip of the soldering iron.


Compared with eutectic solders, lead-free solders have higher bond strengths but slower wetting times and higher melting temperatures (hard to melt/easy to harden).

The following lead-free solders are available as service parts:

- Parts numbers of lead-free solder:
GYP1006 1.0 in dia.
GYP1007 0.6 in dia.
GYP1008 0.3 in dia.

2. SPECIFICATIONS

2.1 SPECIFICATIONS

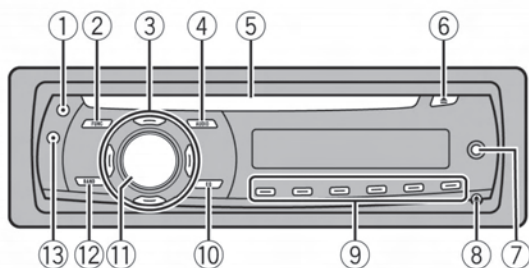
A	<div> <div>General</div> <div> <div>Rated power source 14.4 V DC</div> <div>(allowable voltage range: 12.0 V to 14.4 V DC)</div> <div>Grounding system Negative type</div> <div>Max. current consumption 10.0 A</div> </div> <div>Backup current 2 mA or less</div> <div> <div>Dimensions (W × H × D):</div> <div>DIN</div> <div>Chassis 178 × 50 × 162 mm</div> <div>Nose 188 × 58 × 15 mm</div> <div>D</div> <div>Chassis 178 × 50 × 162 mm</div> <div>Nose 170 × 48 × 15 mm</div> <div>Weight 1.3 kg</div> </div> </div>	<div> <div>AM tuner</div> <div> <div>Frequency range 531 kHz to 1 602 kHz (9 kHz)</div> <div>530 kHz to 1 640 kHz (10 kHz)</div> <div>Usable sensitivity 18 μV (S/N: 20 dB)</div> <div>Signal-to-noise ratio 65 dB (IEC-A network)</div> </div> <div>Infrared remote control</div> <div> <div>Wavelength 940 nm ±50 nm</div> <div>Output typ; 12 mw/sr per Infrared LED</div> </div> <div> <div>Note</div> <div>Specifications and the design are subject to modifications without notice due to improvements. </div> </div> </div>
	<div> <div>Audio</div> <div> <div>Maximum power output 50 W × 4</div> <div>Continuous power output ... 22 W × 4 (50 Hz to 15 000 Hz, 5% THD, 4 Ω load, both channels driven)</div> <div>Load impedance 4 Ω (4 Ω to 8 Ω allowable)</div> <div>Preout max output level 2.2 V</div> <div>Tone controls:</div> <div>Bass</div> <div>Frequency 100 Hz</div> <div>Gain ±13dB</div> <div>Mid</div> <div>Frequency 1 kHz</div> <div>Gain ±12 dB</div> <div>Treble</div> <div>Frequency 10 kHz</div> <div>Gain ±12 dB</div> </div> </div>	
D	<div> <div>CD player</div> <div> <div>System Compact disc audio system</div> <div>Usable discs Compact disc</div> <div>Signal-to-noise ratio 94 dB (1 kHz) (IEC-A network)</div> <div>Number of channels 2 (stereo)</div> <div>WMA decoding format Ver. 7, 7.1, 8, 9, 10, 11 (2ch audio)</div> <div>(Windows Media Player)</div> <div>MP3 decoding format MPEG-1 & 2 Audio Layer 3</div> <div>WAV signal format Linear PCM & MS ADPCM</div> </div> </div>	
E	<div> <div>FM tuner</div> <div> <div>Frequency range 87.5 MHz to 108.0 MHz</div> <div>Usable sensitivity 8 dBf (0.7 μV/75 Ω, mono, S/N: 30 dB)</div> <div>Signal-to-noise ratio 75 dB (IEC-A network)</div> </div> </div>	

2.2 DISC/CONTENT FORMAT



What's What

Head unit



① **CLOCK button**

Press to change to the clock display.

② **FUNCTION button**

Press to recall the function menu when operating a source.

③ **▲/▼/◀/▶ buttons**

Press to perform manual seek tuning, fast forward, reverse and track search controls. Also used for controlling functions.

④ **AUDIO button**

Press to select various sound quality controls.

⑤ **Disc loading slot**

Insert a disc to play.

⑥ **EJECT button**

Press to eject a CD from your built-in CD player.

⑦ **AUX input jack (3.5 mm stereo jack)**

Use to connect an auxiliary equipment.

⑧ **DETACH button**

Press to remove the front panel from the head unit.

⑨ **1 to 6 buttons**

Press for preset tuning.

⑩ **EQ button**

Press to select various equalizer curves. Press and hold to turn loudness on or off.

⑪ **SOURCE button, VOLUME**

This unit is turned on by selecting a source. Press to cycle through all the available sources.

Press and hold to recall the initial setting menu when the sources are off.

Rotate it to increase or decrease the volume.

⑫ **BAND button**

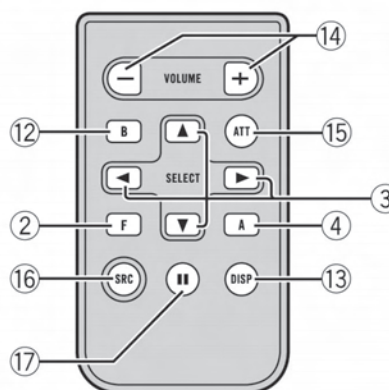
Press to select among three FM bands and one AM band and to cancel the control mode of functions.

⑬ **DISPLAY button**

Press to select different displays.

Remote control

Operation is the same as when using the buttons on the head unit. See the explanation of the head unit about the operation of each button with the exception of **ATT**, which is explained below.



⑭ **VOLUME button**

Press to increase or decrease the volume.

⑮ **ATT button**

Press to quickly lower the volume level by about 90%. Press once more to return to the original volume level.

⑯ **SOURCE button**

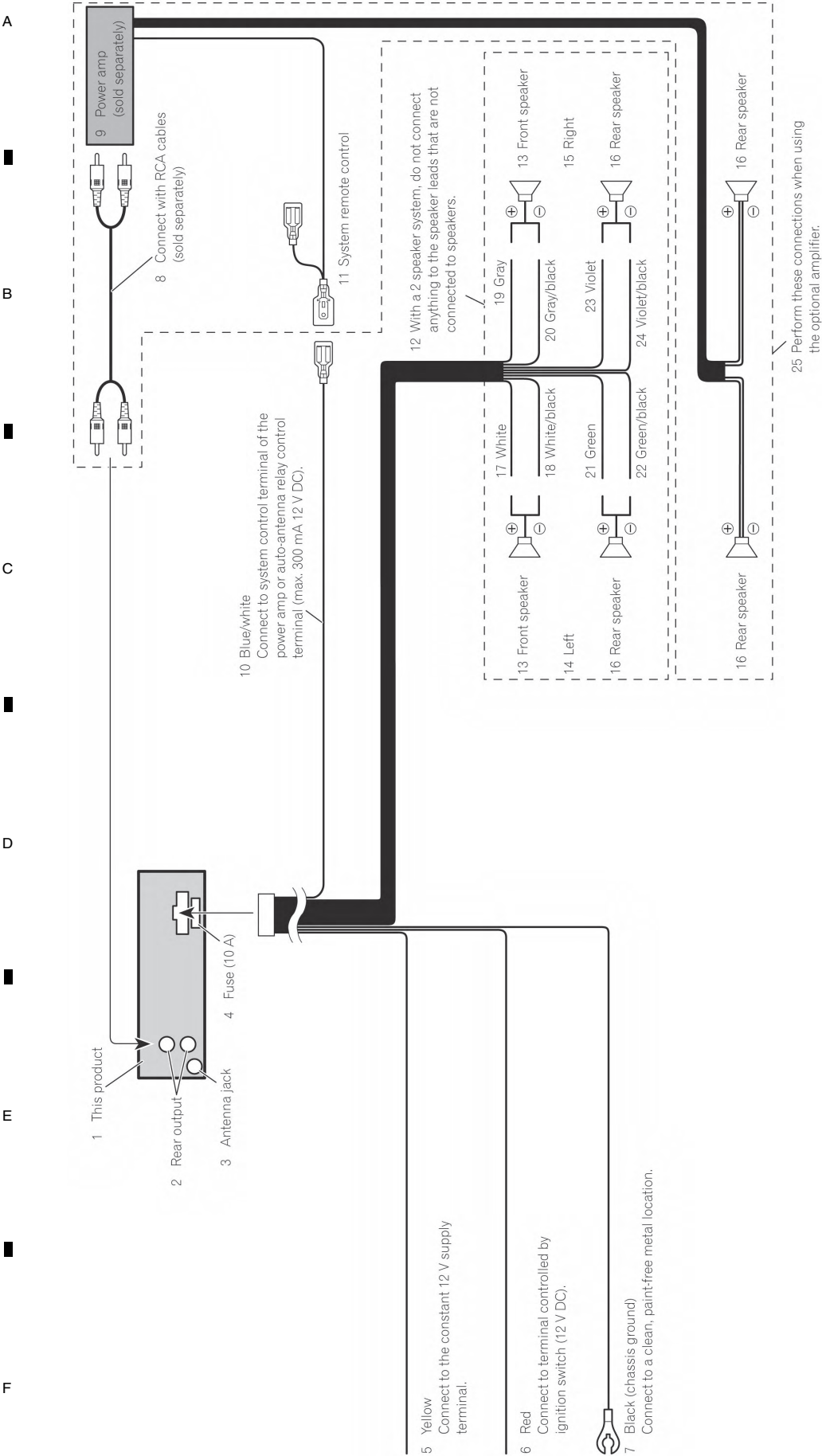
Press to cycle through all the available sources. Press and hold to turn the source off.

⑰ **PAUSE button**

Press to turn pause on or off.

2.4 CONNECTION DIAGRAM

● Connection Diagram



3. BASIC ITEMS FOR SERVICE

3.1 CHECK POINTS AFTER SERVICING

To keep the product quality after servicing, please confirm following check points.

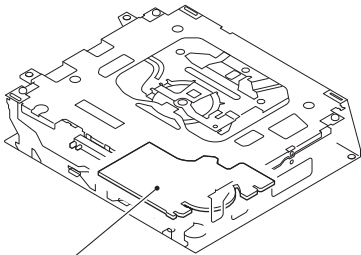
No.		Procedures	Item to be confirmed
1		Confirm whether the customer complain has been solved. If the customer complain occurs with the specific media, use it for the operation check.	The customer complain must not be reappeared. Display, audio and operations must be normal.
2	CD	Play back a CD. (Track search)	No malfunction on display, audio and operation. Display, audio and operations must be normal.
3	FM/AM tuner	Check FM/AM tuner action. (Seek, Preset) Switch band to check both FM and AM.	Display, audio and operations must be normal.
4		Check whether no disc is inside the product.	The media used for the operating check must be ejected.
5		Appearance check	No scratches or dirt on its appearance after receiving it for service.

See the table below for the items to be checked regarding video and audio:

Item to be checked regarding audio
Distortion
Noise
Volume too low
Volume too high
Volume fluctuating
Sound interrupted

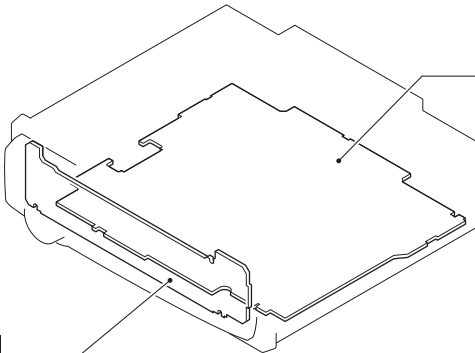
3.2 PCB LOCATIONS

A



C
CD Core Unit(S10.5)

B



B
Keyboard Unit

A

Tuner Amp Unit

C

D

Unit Number	:	YWM5234
Unit Name	:	Tuner Amp Unit
Unit Number	:	(2050MP/XN/ES)
Unit Name	:	Keyboard Unit
Unit Number	:	(2050MPG/XN/ES)
Unit Number	:	(2050MPG/XN/ES1)
Unit Name	:	Keyboard Unit
Unit Number	:	CWX3514
Unit Name	:	CD Core Unit(S10.5COMP2)

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3.3 JIGS LIST

● Jigs List

Name	Jig No.	Remarks
Test Disc	TCD-782	Checking the grating
L.P.F.		Checking the grating (Two pieces)

● Grease List

Name	Grease No.	Remarks
Grease	GEM1024	CD Mechanism Module
Grease	GEM1045	CD Mechanism Module



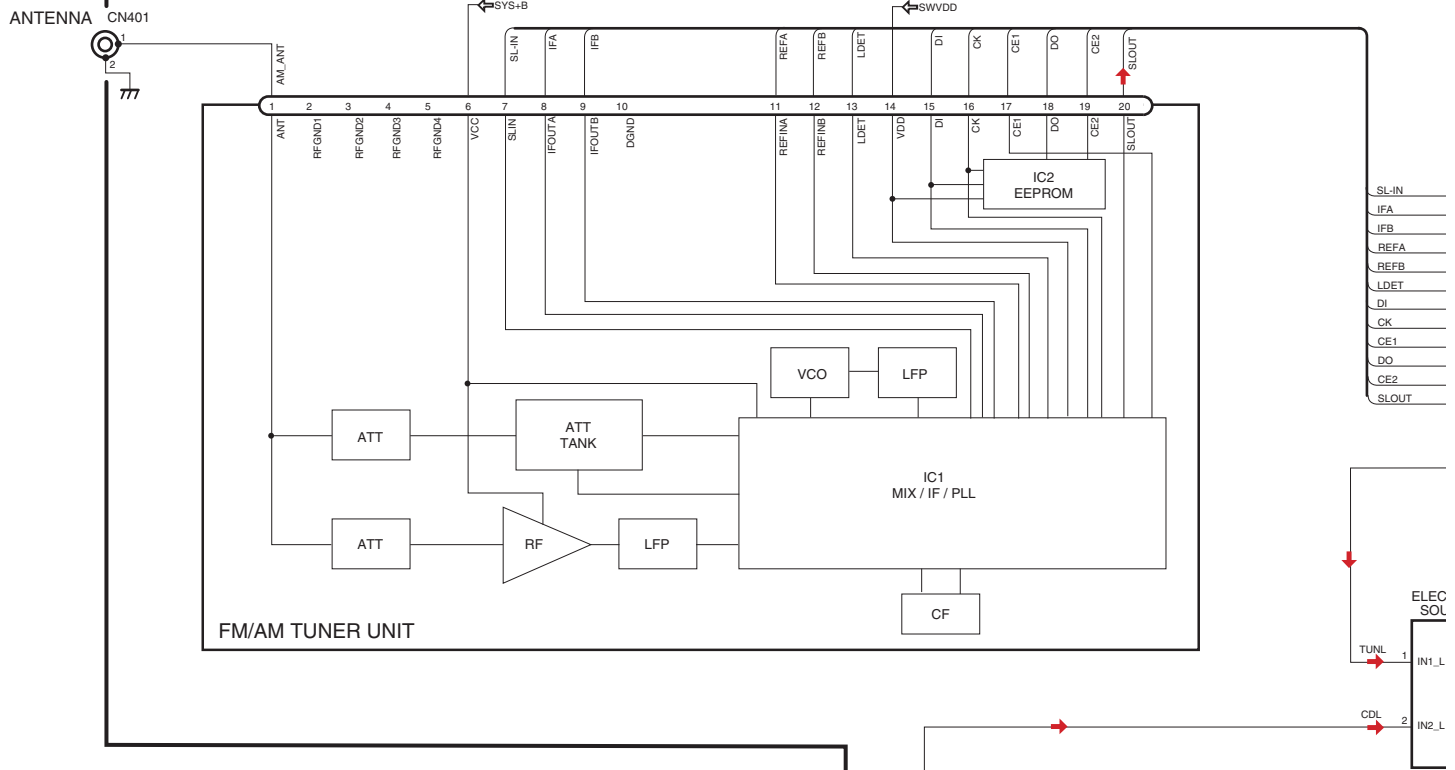
Before shipping out the product, be sure to clean the following portions by using the prescribed cleaning tools:

Portions to be cleaned	Cleaning tools
CD pickup lenses	Cleaning liquid : GEM1004 Cleaning paper : GED-008

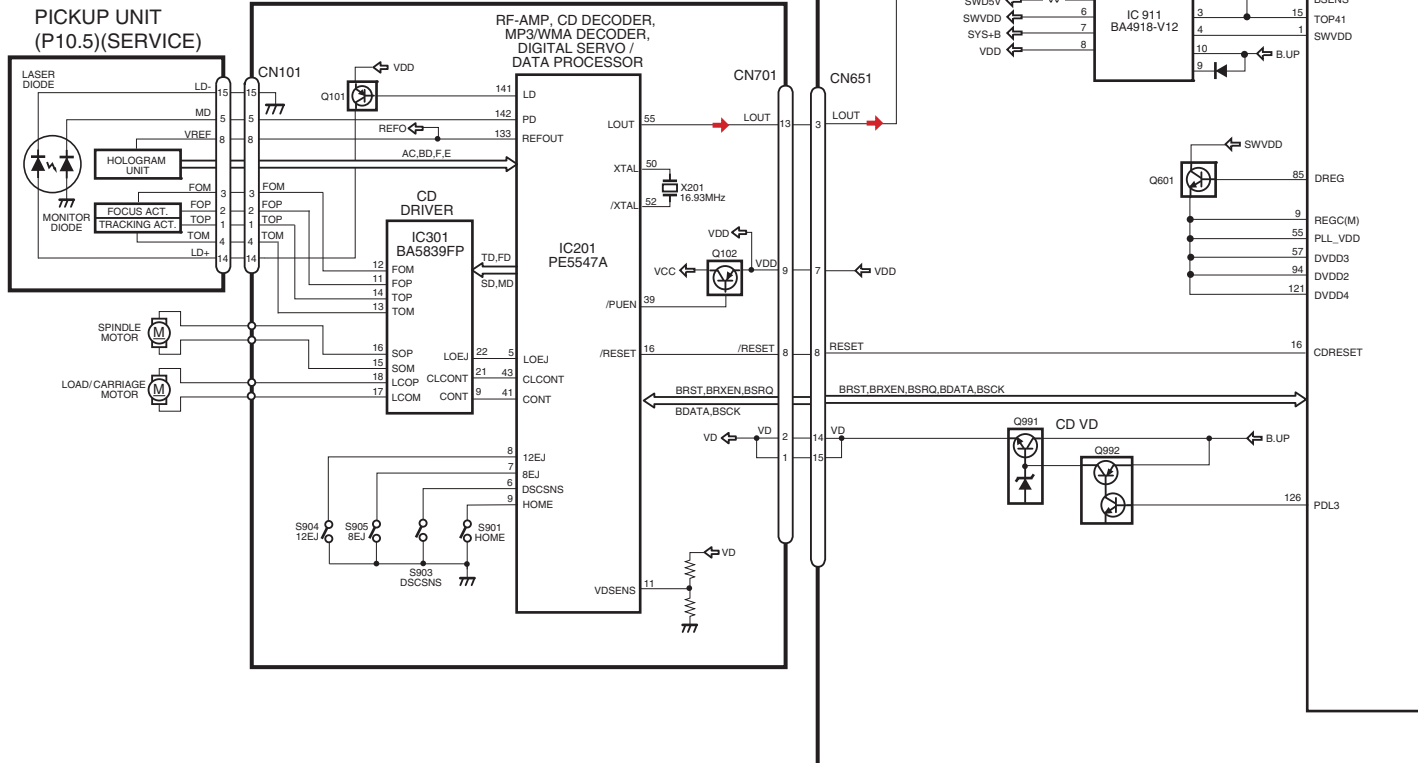
4. BLOCK DIAGRAM

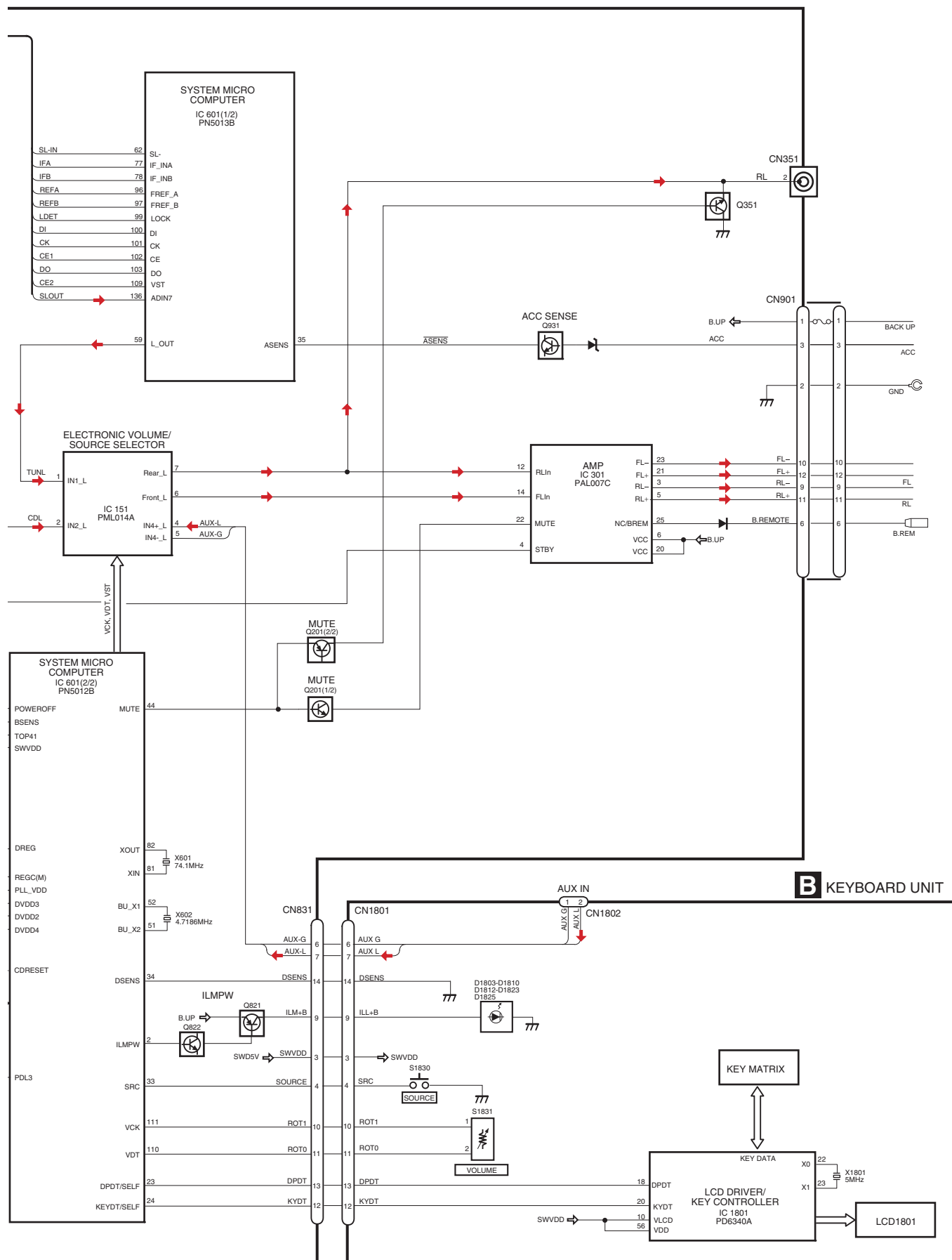
4.1 BLOCK DIAGRAM

A TUNER AMP UNIT

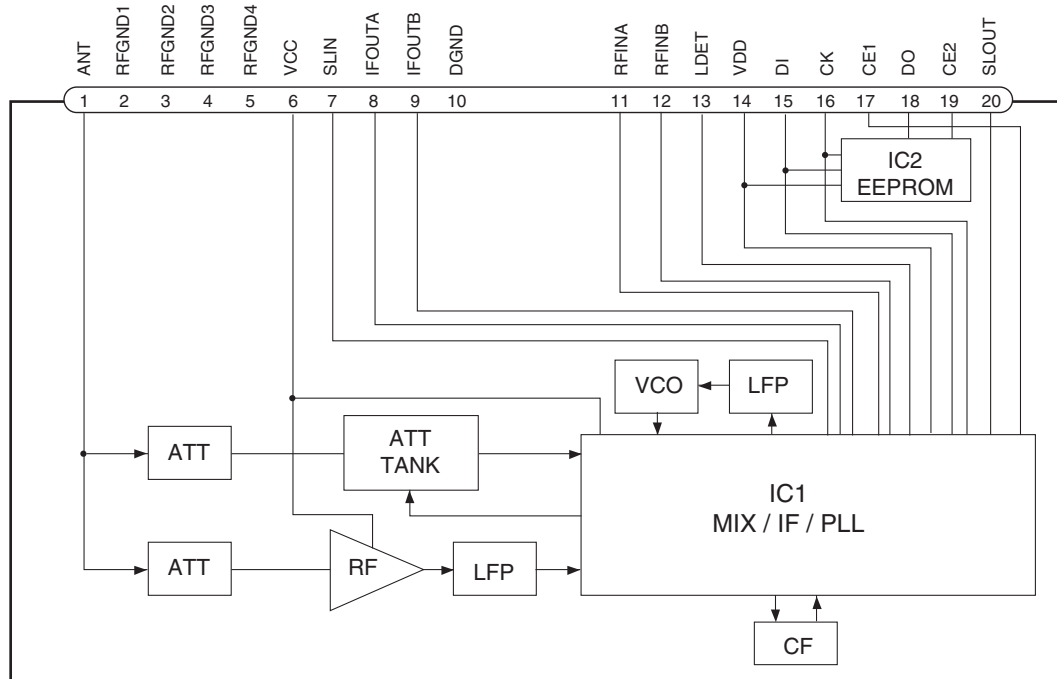


C CD CORE UNIT(S10.5COMP2)





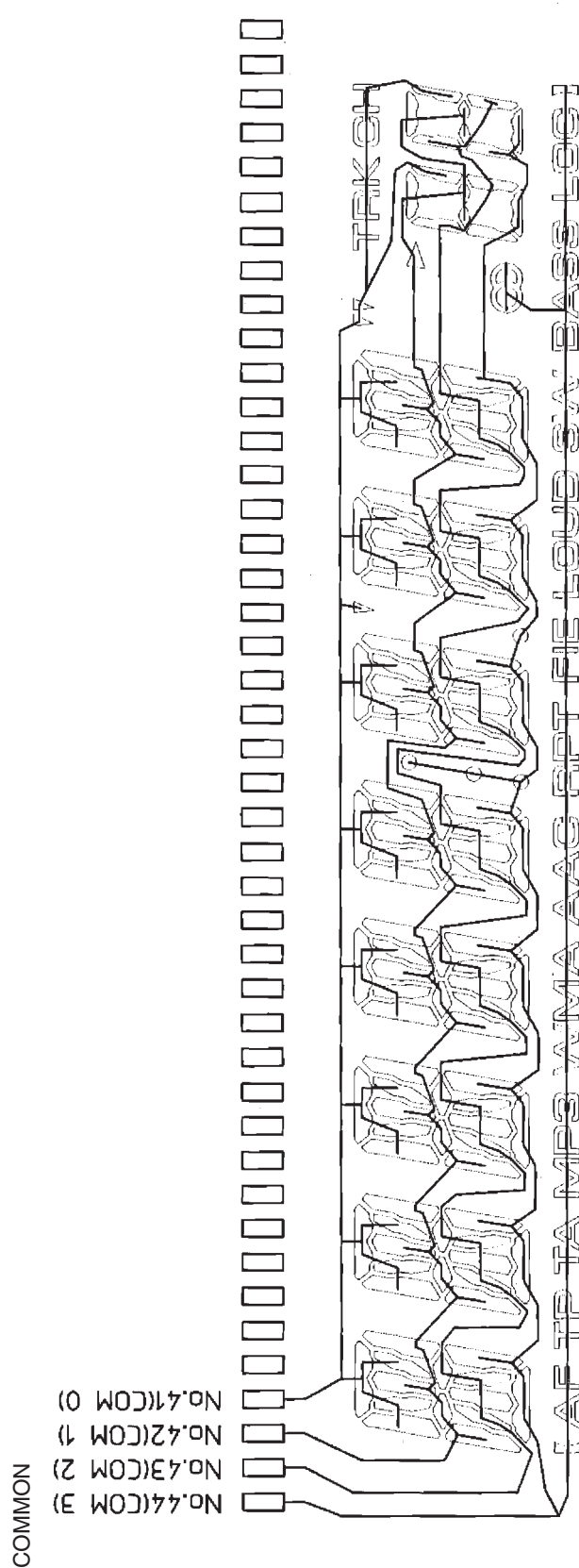
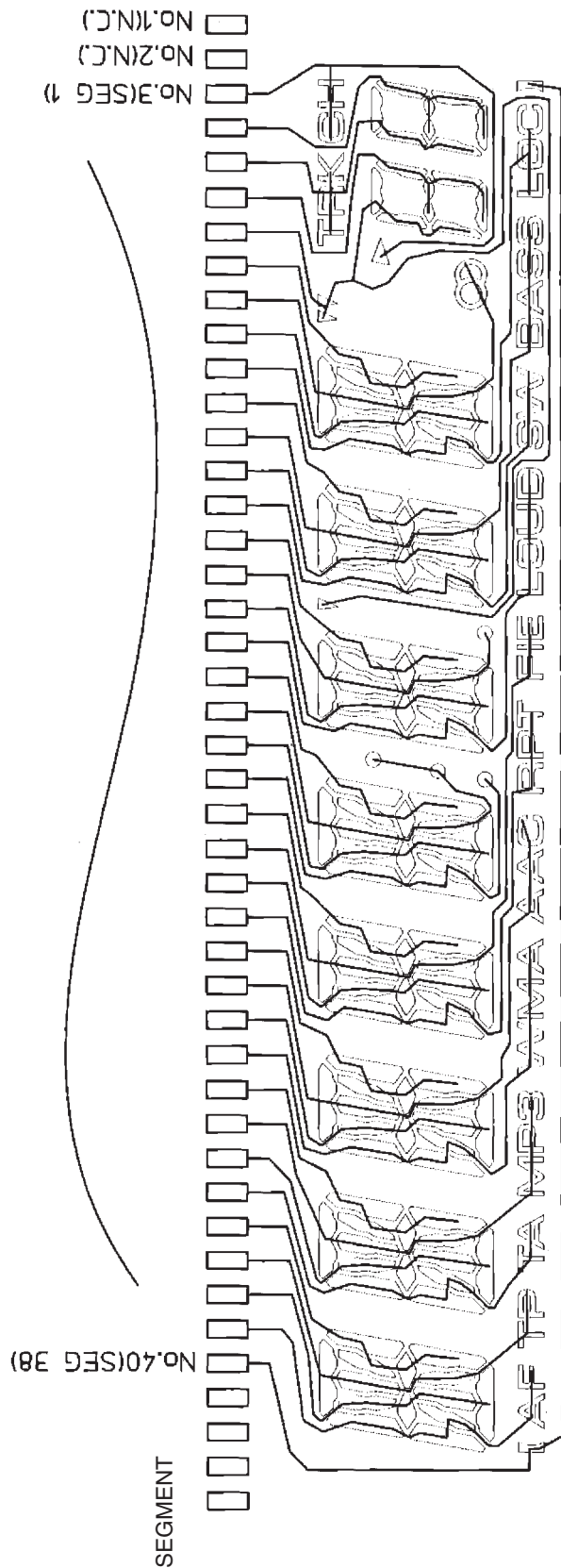
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No.	Symbol	I/O	Explain	
1	ANT	I	Antenna Input	Antenna input. 75 ohm. Surge absorber is necessary. Series circuit including an inductor and a resistor is connected with RF ground for the countermeasure against the ham of power transmission line.
2	RFGND1		RF Ground	Ground of R.F. block
3	RFGND2		RF Ground	Ground of R.F. block
4	RFGND3		RF Ground	Ground of R.F. block
5	RFGND4		RF Ground	Ground of R.F. block
6	VCC		Power Supply	Power supply for Analog block. D.C 8.4 V \pm 0.3 V (performance isn't guaranteed besides 8.4 V)
7	SLIN	I	Signal Level Input	Input signal level from BE_IC
8	IFOUTA	O	IF Output	IF signal output (F.E.output)
9	IFOUTB	O	IF Output	IF signal output (F.E.output)
10	DGND		Digital Ground	Ground of Digital. block
11	REFINA	I	Reference Signal	Input reference signal for PLL part with FE_IC
12	REFINB	I	Reference Signal	Input reference signal for PLL part with FE_IC
13	LDET	O	Lock Detector	PLL lock detector output "High" active
14	VDD		Power Supply	Power supply for Digital block. D.C 3.3 V \pm 0.2 V
15	DI	I	Data In	Data input (not sending data in tuner reception operating in noise being output)
16	CK	I	CK	Clock data input(not sending data in tuner reception operating in noise being output)
17	CE1	I	Chip Enable-1	Chip enable for FE_IC "High" active
18	DO	O	Data Out	Data output
19	CE2	O	Chip Enable-2	Chip enable for EEPROM "Low" active. in power ON/OFF, please turn CE2 into "High" (= VDD).
20	SLOUT	O	Signal Level Output	Output of FM/AM signals level (D.C.)

F

● LCD(CAW1930)



1234

5. DIAGNOSIS

5.1 OPERATIONAL FLOW CHART

A

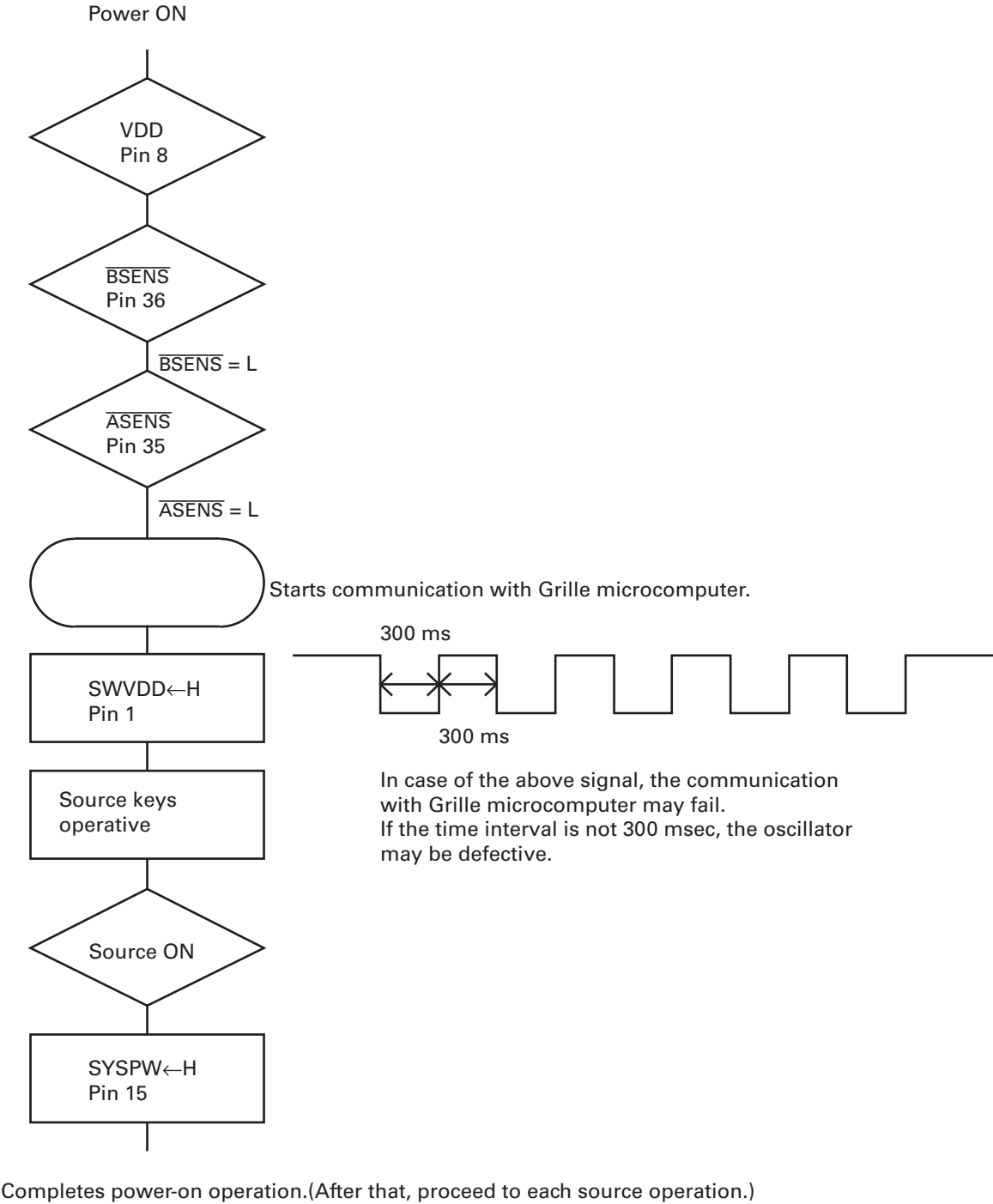
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5.2 ERROR CODE LIST

● Error Messages

If a CD is not operative or stopped during operation due to an error, the error mode is turned on and cause(s) of the error is indicated with a corresponding number. This arrangement is intended at reducing nonsense calls from the users and also for facilitating trouble analysis and repair work in servicing.

(1) Basic Indication Method

1) When SERRORM is selected for the CSMOD (CD mode area for the system), error codes are written to DMIN (minutes display area) and DSEC (seconds display area). The same data is written to DMIN and DSEC. DTNO remains in blank as before.

2) Head unit display examples

Depending on display capability of LCD used, display will vary as shown below. xx contains the error number.

8-digit display	6-digit display	4-digit display
ERROR-xx	ERR-xx	E-xx

(2) Error Code List

Code	Class	Displayed error code	Description of the code and potential cause(s)
10	Electricity	Carriage Home NG SERVO LSI Communication Error	CRG can't be moved to inner diameter. CRG can't be moved from inner diameter. → Failure on home switch or CRG move mechanism. Communication error between microcomputer and SERVO LSI.
11	Electricity	Focus Servo NG	Focusing not available. → Stains on rear side of disc or excessive vibrations on REWRITABLE.
12	Electricity	Spindle Lock NG Subcode NG	Spindle not locked. Sub-code is strange (not readable). → Failure on spindle, stains or damages on disc, or excessive vibrations. A disc not containing CD-R data is found. Turned over disc are found, though rarely. CD signal error.
17	Electricity	Setup NG	AGC protection doesn't work. Focus can be easily lost. → Damages or stains on disc, or excessive vibrations on REWRITABLE.
30	Electricity	SearchTime Out	Failed to reach target address. → CRG tracking error or damages on disc.
44	Electricity	ALL Skip	Skip setting for all track. (CD-R/RW)
50	Mechanism	CD On Mech Error	Mechanical error during CD ON. → Defective loading motor, mechanical lock and mechanical sensor.
A0	System	Power Supply NG	Power (VD) is ground faulted. → Failure on SW transistor or power supply (failure on connector).

Remarks: Mechanical errors are not displayed (because a CD is turned off in these errors).

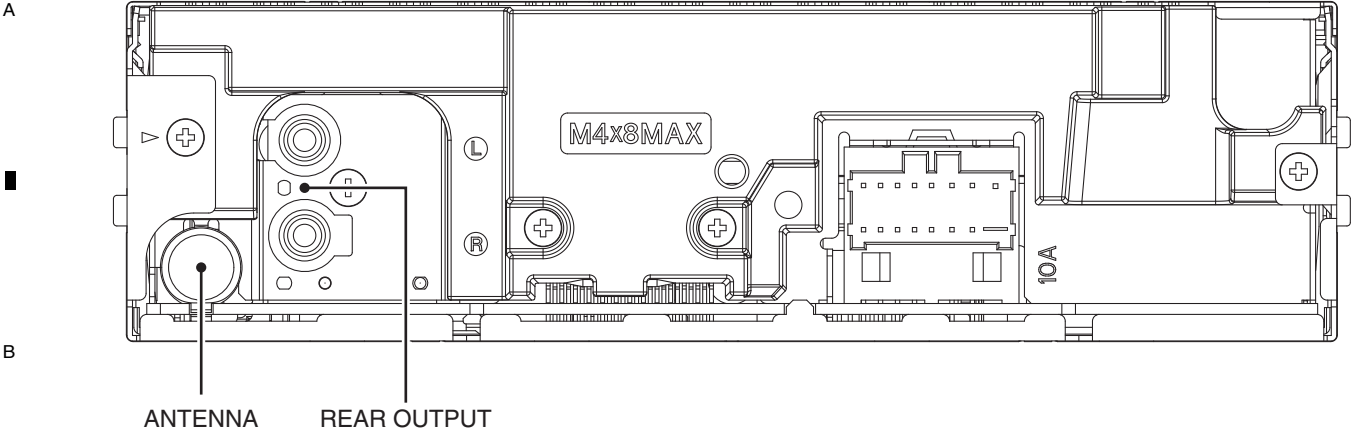
Unreadable TOC does not constitute an error. An intended operation continues in this case.

Upper digits of an error code are subdivided as shown below:

1x: Setup relevant errors, 3x: Search relevant errors, Ax: Other errors.

1 2 3 4

5.3 CONNECTOR FUNCTION DESCRIPTION



D

Pin No.		Pin No.	
1	B. UP	9	RL-
2	GND	10	FL-
3	ACC	11	RL+
4	NC	12	FL+
5	NC	13	RR-
6	B.REM	14	FR-
7	NC	15	RR+
8	TEL	16	FR+

E

F

6. SERVICE MODE

6.1 CD TEST MODE

1) Cautions on adjustments

- In this product the single voltage (3.3V) is used for the regulator. The reference voltage is the REFO1 (1.65V) instead of the GND.

If you should mistakenly short the REFO1 with the GND during adjustment, accurate voltage will not be obtained, and the servo's misoperation will apply excessive shock to the pickup. To avoid such problems:

- a. Do not mix up the REFO1 with the GND when connecting the (-) probe of measuring instruments. Especially on an oscilloscope, avoid connecting the (-) probe for CH1 to the GND.
- b. In many cases, measuring instruments have the same potential as that for the (-) probe. Be sure to set the measuring instruments to the floating state.
- c. If you have mistakenly connected the REFO1 to the GND, turn off the regulator or the power immediately.

- Before mounting and removing filters or leads for adjustment, be sure to turn off the regulator.

- For stable circuit operation, keep the mechanism operating for about one minute or more after the regulator is turned on.

- In the test mode, any software protections will not work. Avoid applying any mechanical or electrical shock to the mechanism during adjustment.

- The RFI and RFO signals with a wide frequency range are easy to oscillate. When observing the signals, insert a resistor of 1k ohms in series.

- The load and eject operation is not guaranteed with the mechanism upside down. If the mechanism is blocked due to mistaken eject operation, reset the product or turn off and on the ACC to restore it.

2) Test mode

This mode is used to adjust the CD mechanism module.

- To enter the test mode.
While pressing the 4 and 6 keys at the same time, reset.
- To exit from the test mode.
Turn off the ACC and back up.

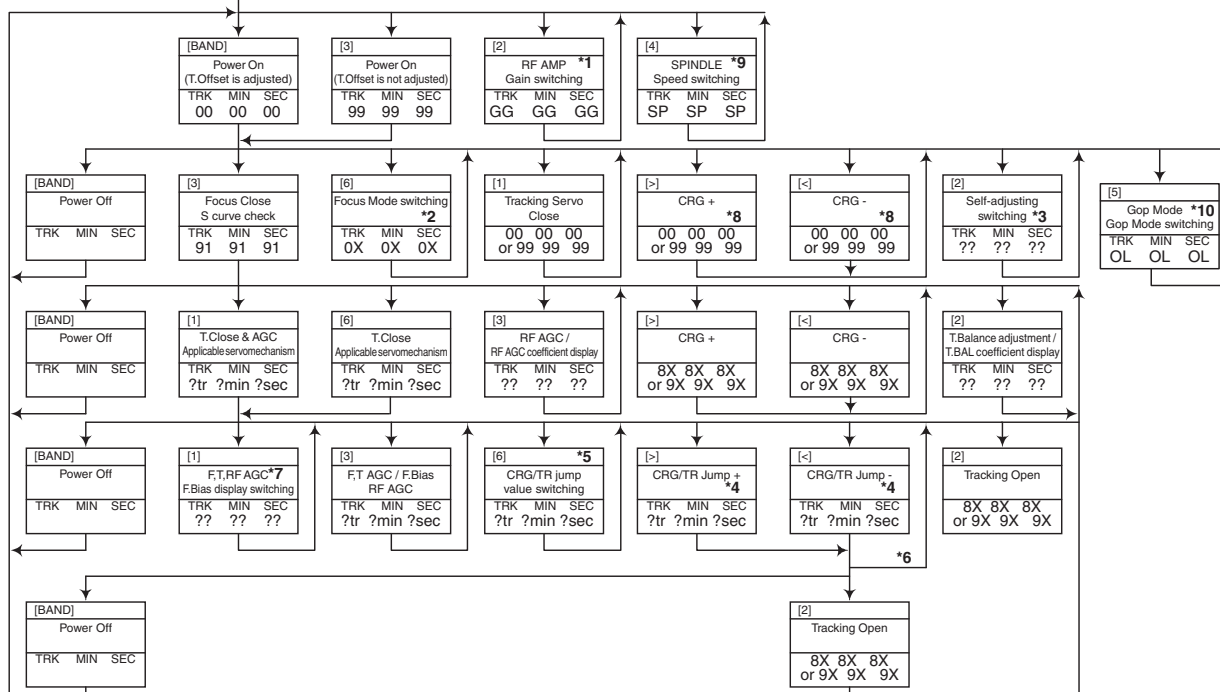
Notes:

- a. During ejection, do not press any other keys than the EJECT key until the loaded disc is ejected.
- b. If you have pressed the (→) key or (←) key during focus search, turn off the power immediately to protect the actuator from damage caused by the lens stuck.
- c. For the TR jump modes except 100TR, the track jump operation will continue even if the key is released.
- d. For the CRG move and 100TR jump modes, the tracking loop will be closed at the same time when the key is released.
- e. When the power is turned off and on, the jump mode is reset to the single TR (91), the RF amp gain is set to 0 dB, and the auto-adjustment values are reset to the default settings.

Flow Chart

[Key]	[4] + [6] + Reset or [4] + [6] + BU + ACC Test Mode In
Contents	
Display	

[CD] or [SOURCE]
Source On
TRK MIN SEC



*1) TYP → + 6 dB → + 12 dB
TRK MIN SEC → TRK₀₆MIN₀₆SEC₀₆ → TRK₁₂MIN₁₂SEC₁₂

*2) Focus Close → S Curve check setting → F EQ measurement setting
TRK₀₀MIN₀₀SEC₀₀ → TRK₀₁MIN₀₁SEC₀₁ → TRK₀₂MIN₀₂SEC₀₂
(TRK₉₉MIN₉₉SEC₉₉)

*3) F.Offset Display → RF.Offset → T.Offset Display → Switch to the order of the original display

*4) 1TR/4TR/10TR/32TR/100TR

*5) Single → 4TR → 10TR → 32TR → 100TR → CRG Move
9x(8x):91(81) 92(82) 93(83) 94(84) 95(85) 96(86)

*6) Only at the time of CRG move, 100TR jump

*7) TRK/MIN/SEC → F.AGC → T.AGC Gain → F.Bias → RF AGC

*8) CRG motor voltage = 2 [V]

*9) TYP (1X) → 2X → 1X
TRK MIN SEC → TRK₂₂MIN₂₂SEC₂₂ → TRK₁₁MIN₁₁SEC₁₁

*10) OFF(TYP) → FORCUS → TRACKING
TRK MIN SEC → TRK₇₀MIN₇₀SEC₇₀ → TRK₇₁MIN₇₁SEC₇₁

• As for the double speed (2x), audio output cannot be supported

*) • After the [Eject] key is pressed keys other than the [Eject] key should not be pressed, until disc ejection is complete.

• When the key [2] or [3] is pressed during the Focus Search, the power supply should be immediately turned off (otherwise the lens sticks to Wall, causing the actuator to be damaged).

• In the case of TR jump other than to 100TR, the function shall continue to be processed even if the TR jump key is released. As for the CRG Move and 100TR Jump, the mechanism shall be set to the Tracking Close mode when the key is released.

• When the power is turned on/off the jump mode is reset to the Single TR (91) while the gain of the RFAMP is reset to 0 dB. At the same time all the self-adjusting values shall return to the default setting.

[Key]	Operation
[BAND]	Power On/Off
[>]	CRG + / TR Jump + (Direction of the external surface)
[<]	CRG - / TR Jump - (Direction of the internal surface)
[1]	T. CLS & AGC & Applicable servomechanism / AGC, AGC display setting
[2]	RF Gain switching / Offset adjustment display / T.Balance adjustment / T. Open
[3]	F. Close, S Curve / Rough Servo and RF AGC / F.T, RF AGC
[4]	SPDL 1X/2X switching As for the double speed(2x), audio output <u>cannot</u> be supported.
[5]	Error Rate measurement ON : ERR 30Counts Start BER display data[%]
[6]	F. Mode switching / Tracking Close / CRG•TR Jump Switching

6.2 CHECKING THE GRATING AFTER CHANGING THE PICKUP UNIT



• Note :

The grating angle of the PU unit cannot be adjusted after the PU unit is changed. The PU unit in the CD mechanism module is adjusted on the production line to match the CD mechanism module and is thus the best adjusted PU unit for the CD mechanism module. Changing the PU unit is thus best considered as a last resort. However, if the PU unit must be changed, the grating should be checked using the procedure below.

• Purpose :

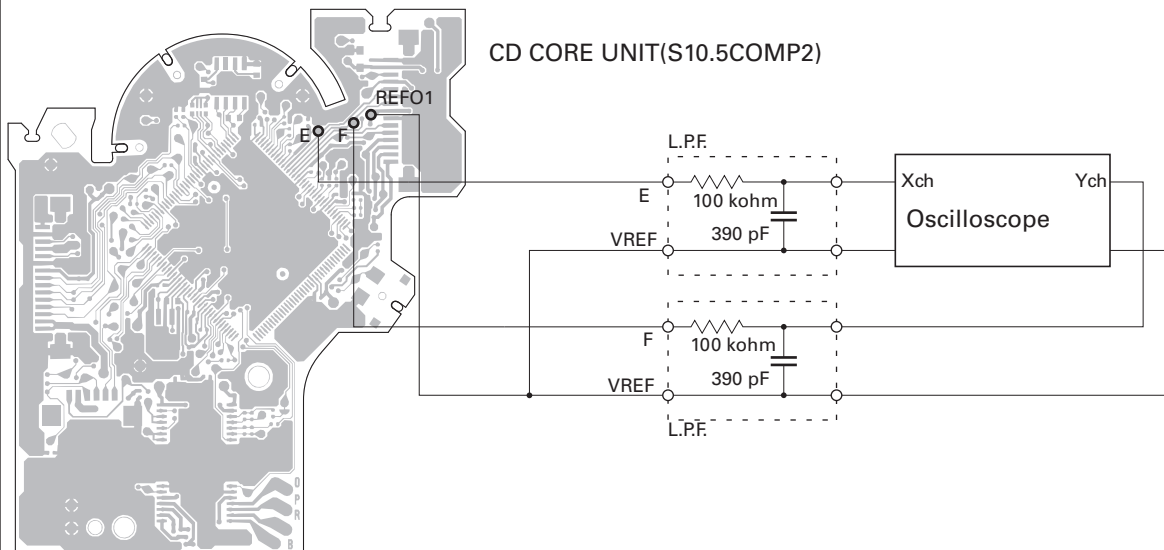
To check that the grating is within an acceptable range when the PU unit is changed.

• Symptoms of Mal-adjustment :

If the grating is off by a large amount symptoms such as being unable to close tracking, being unable to perform track search operations, or taking a long time for track searching.

• Method :

- | | |
|-----------------------|----------------------------|
| • Measuring Equipment | • Oscilloscope, Two L.P.F. |
| • Measuring Points | • E, F, REFO1 |
| • Disc | • TCD-782 |
| • Mode | • TEST MODE |



• Checking Procedure

1. In test mode, load the disc and switch the 3 V regulator on.
2. Using the → and ← buttons, move the PU unit to the innermost track.
3. Press key 3 to close focus, the display should read "91". Press key 2 to implement the tracking balance adjustment the display should now read "81". Press key 3. The display will change, returning to "81" on the fourth press.
4. As shown in the diagram above, monitor the LPF outputs using the oscilloscope and check that the phase difference is within 75 degrees. Refer to the photographs supplied to determine the phase angle.
5. If the phase difference is determined to be greater than 75 degrees try changing the PU unit to see if there is any improvement. If, after trying this a number of times, the grating angle does not become less than 75 degrees then the mechanism should be judged to be at fault.

• Note

Because of eccentricity in the disc and a slight misalignment of the clamping center the grating waveform may be seen to "wobble" (the phase difference changes as the disc rotates). The angle specified above indicates the average angle.

• Hint

Reloading the disc changes the clamp position and may decrease the "wobble".

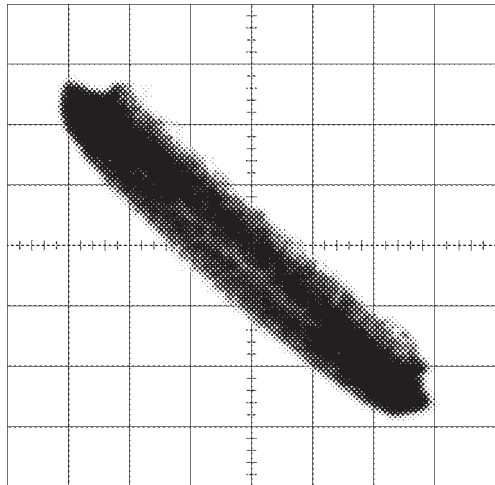
Grating waveform

Ech → Xch 20 mV/div, AC

Fch → Ych 20 mV/div, AC

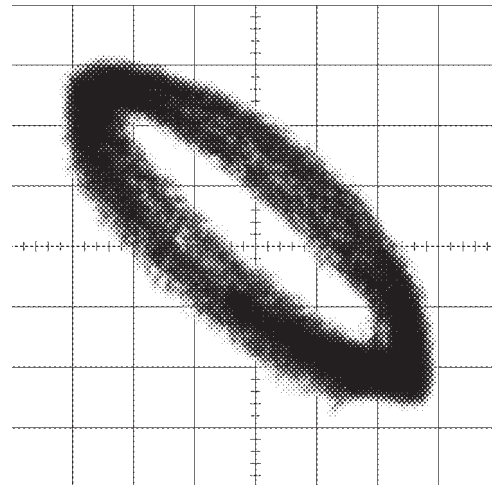
A

0 degrees



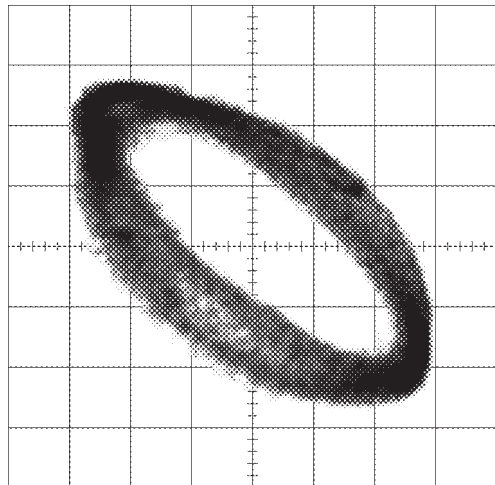
B

30 degrees



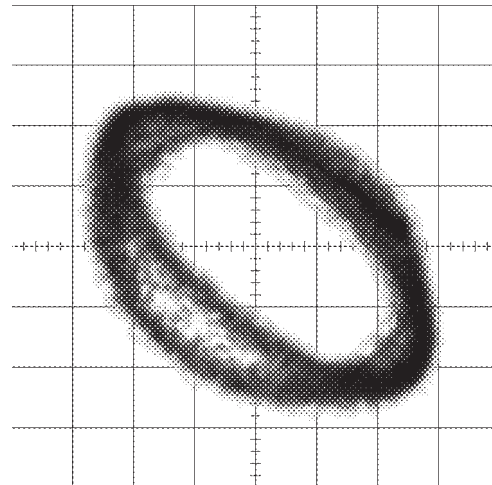
C

45 degrees



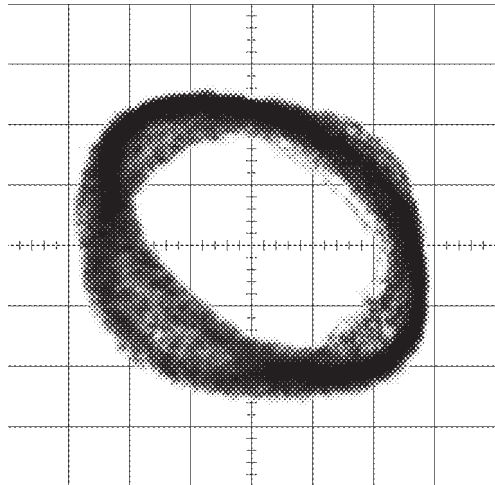
D

60 degrees



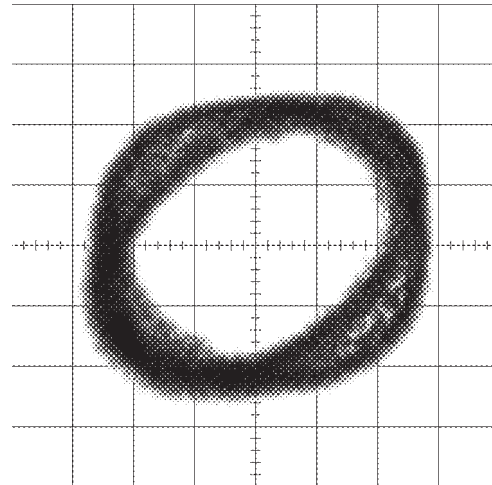
E

75 degrees



F

90 degrees



7. DISASSEMBLY

While the photograph shown is slightly different from this model in shape, the disassembly procedure is the same.

● Removing the Case (not shown)

1. Remove the Case.

● Removing the CD Mechanism Module (Fig.1)

- 1 Remove the four screws.

Disconnect the connector and then remove the CD Mechanism Module.

● Removing the Grille Assy (Fig.1)

- 2 Release the two latches and then remove the Grille Assy.

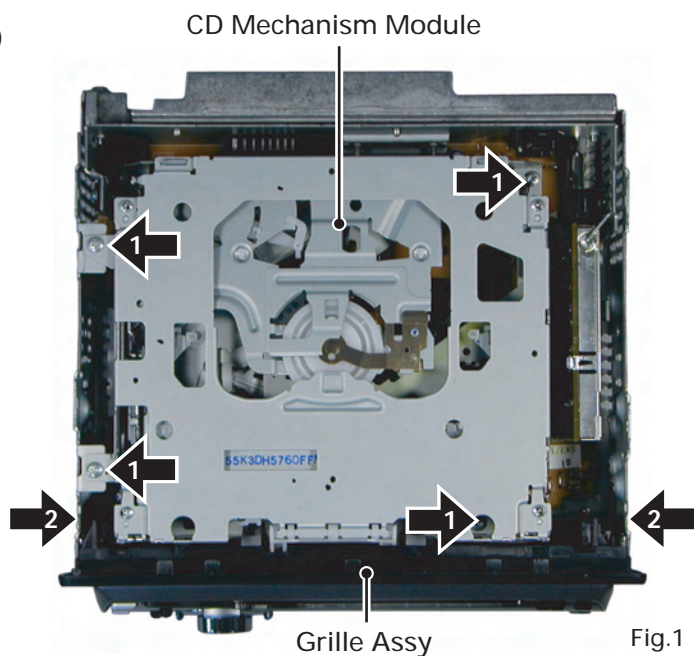


Fig.1

● Removing the Tuner Amp Unit (Fig.2)

- 1 Remove the two screws.
- 2 Remove the two screws.
- 3 Straighten the tabs at two locations indicated.
- 4 Remove the two screws and then remove the Tuner Amp Unit.

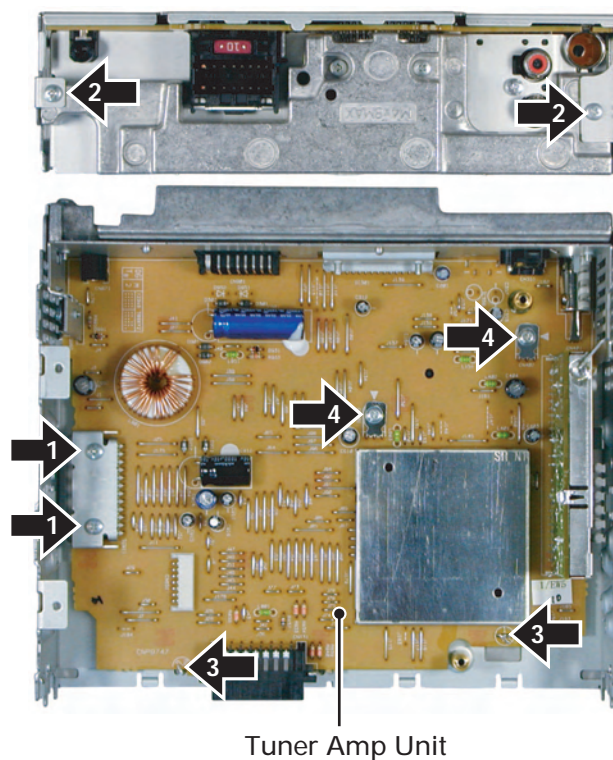
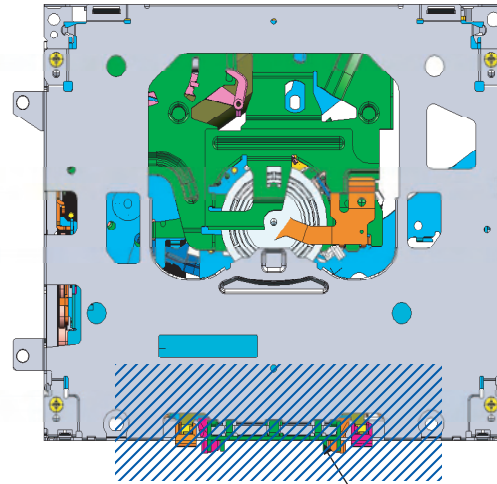


Fig.2

● How to hold the Mechanism Unit

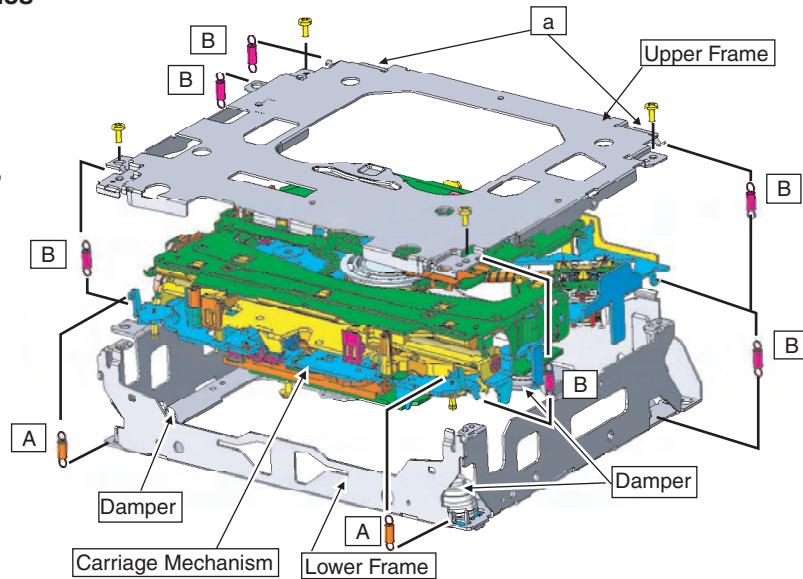
1. Hold the Upper and Lower Frames.
2. Do not hold the front portion of the Upper Frame, because it is not very solid.



Do not squeeze this area.

● Removing the Upper and Lower Frames

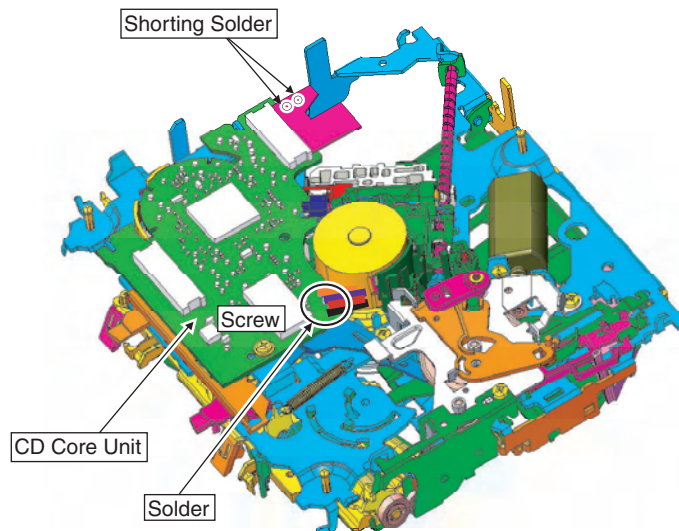
1. With a disc inserted and clamped in the mechanism, remove the two Springs (A), the six Springs (B), and the four Screws.
 2. Turn the Upper Frame using the part "a" as a pivot, and remove the Upper Frame.
 3. While lifting the Carriage Mechanism, remove it from the three Dampers.
- Caution: When assembling, be sure to apply some alcohol to the Dampers and assemble the mechanism in a clamped state.



● How to remove the CD Core Unit

1. Apply Shorting Solder to the flexible cable of the Pickup, and disconnect it from the connector.
2. Unsolder the four leads, and loosen the Screw.
3. Remove the CD Core Unit.

Caution: When assembling the CD Core Unit, assemble it with the SW in a clamped state so as not to damage it.

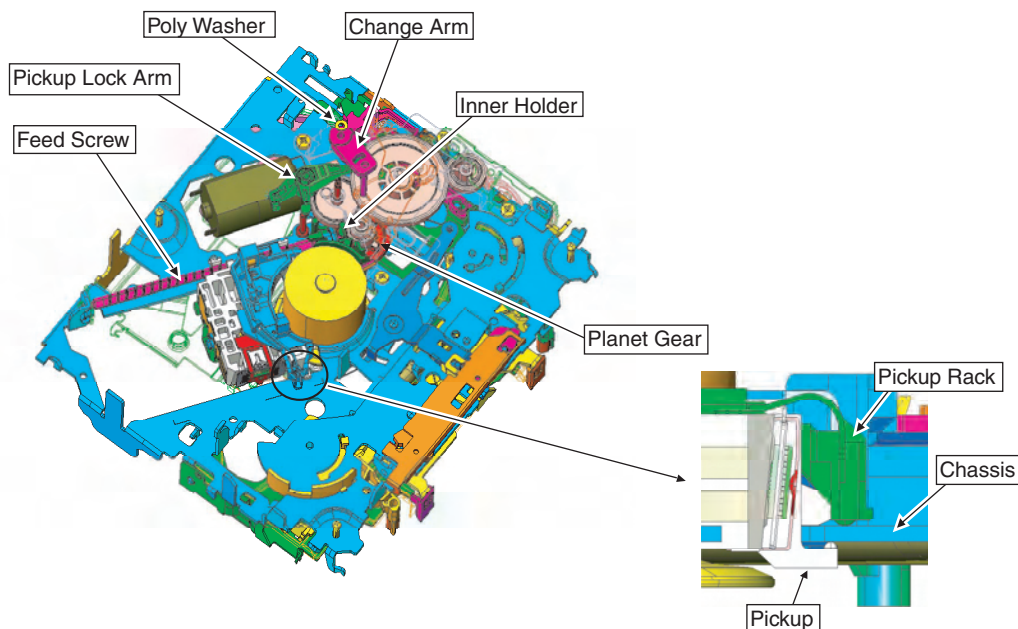


● How to remove the Pickup Unit

1. Make the system in the carriage mechanism mode, and have it clamped.
2. Remove the CD Core Unit and remove the leads from the Inner Holder.
3. Remove the Poly Washer, Change Arm, and Pickup Lock Arm.
4. While releasing from the hook of the Inner Holder, lift the end of the Feed Screw.

Caution: When assembling, move the Planet Gear to the load/eject position before setting the Feed Screw in the Inner Holder.

Assemble the sub unit side of the Pickup, taking the plate (Chassis) in-between. When treating the leads of the Load Carriage Motor Assy, do not make them loose over the Feed Screw.



8. EACH SETTING AND ADJUSTMENT

8.1 PCL OUTPUT CONFIRMATION



● PCL Output



In the normal operation mode (with the detachable panel installed, the ACC switched ON, the standby mode cancelled), shift the TESTIN IC601(Pin 112) terminal to H. The clock signal is output from the SCET IC601(Pin 43) terminal.

The frequency of the clock signal is 1 Hz. The clock signal should be $1 \text{ Hz} \pm 0.000 \text{ 04 Hz}$.

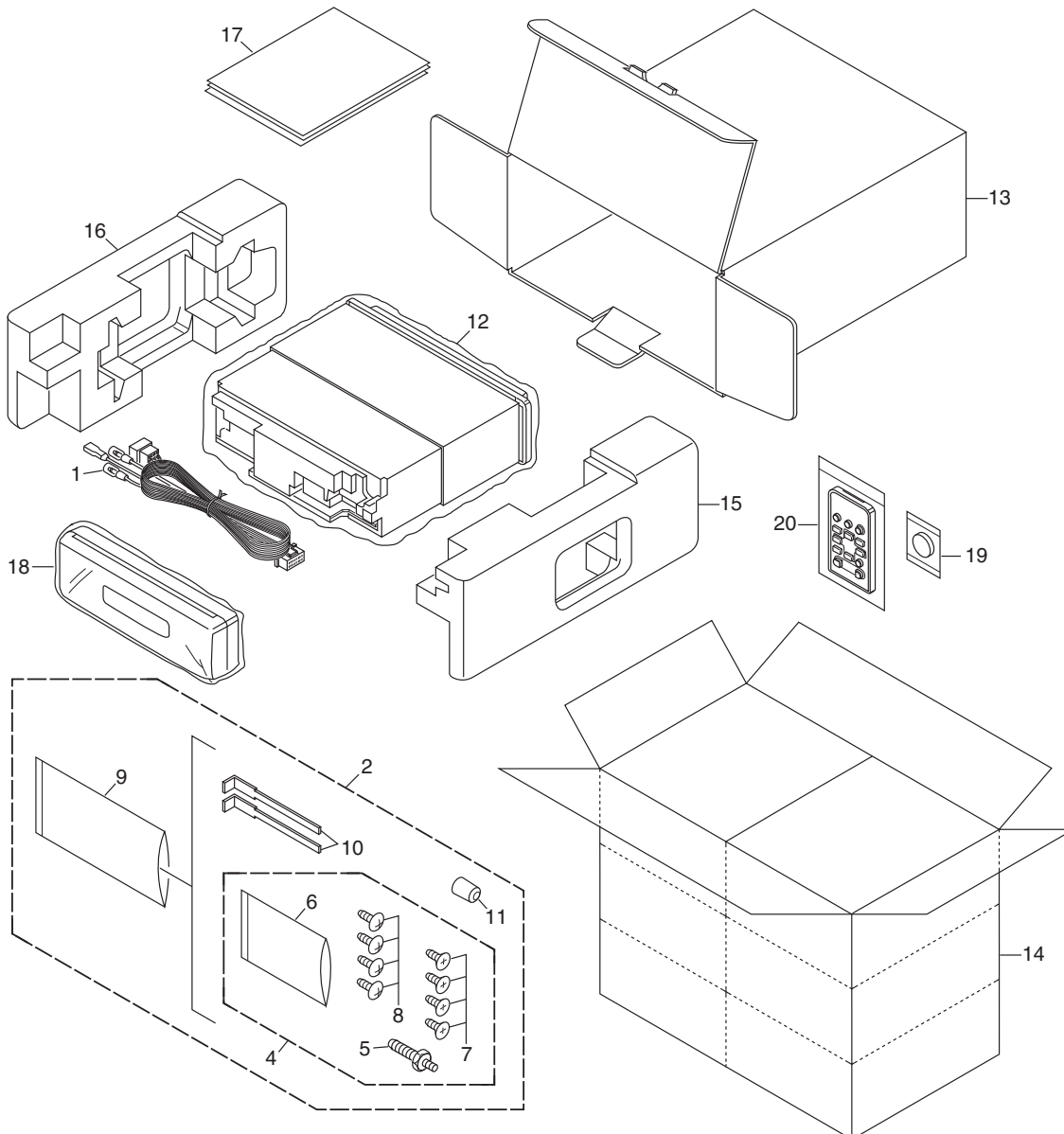
If the clock signal is out of the range, the X'tal (X601) should be replaced with new one.

9. EXPLODED VIEWS AND PARTS LIST

NOTES : • Parts marked by " * " are generally unavailable because they are not in our Master Spare Parts List.

- The  mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- Screw adjacent to  mark on the product are used for disassembly.
- For the applying amount of lubricants or glue, follow the instructions in this manual.
(In the case of no amount instructions, apply as you think it appropriate.)

9.1 PACKING



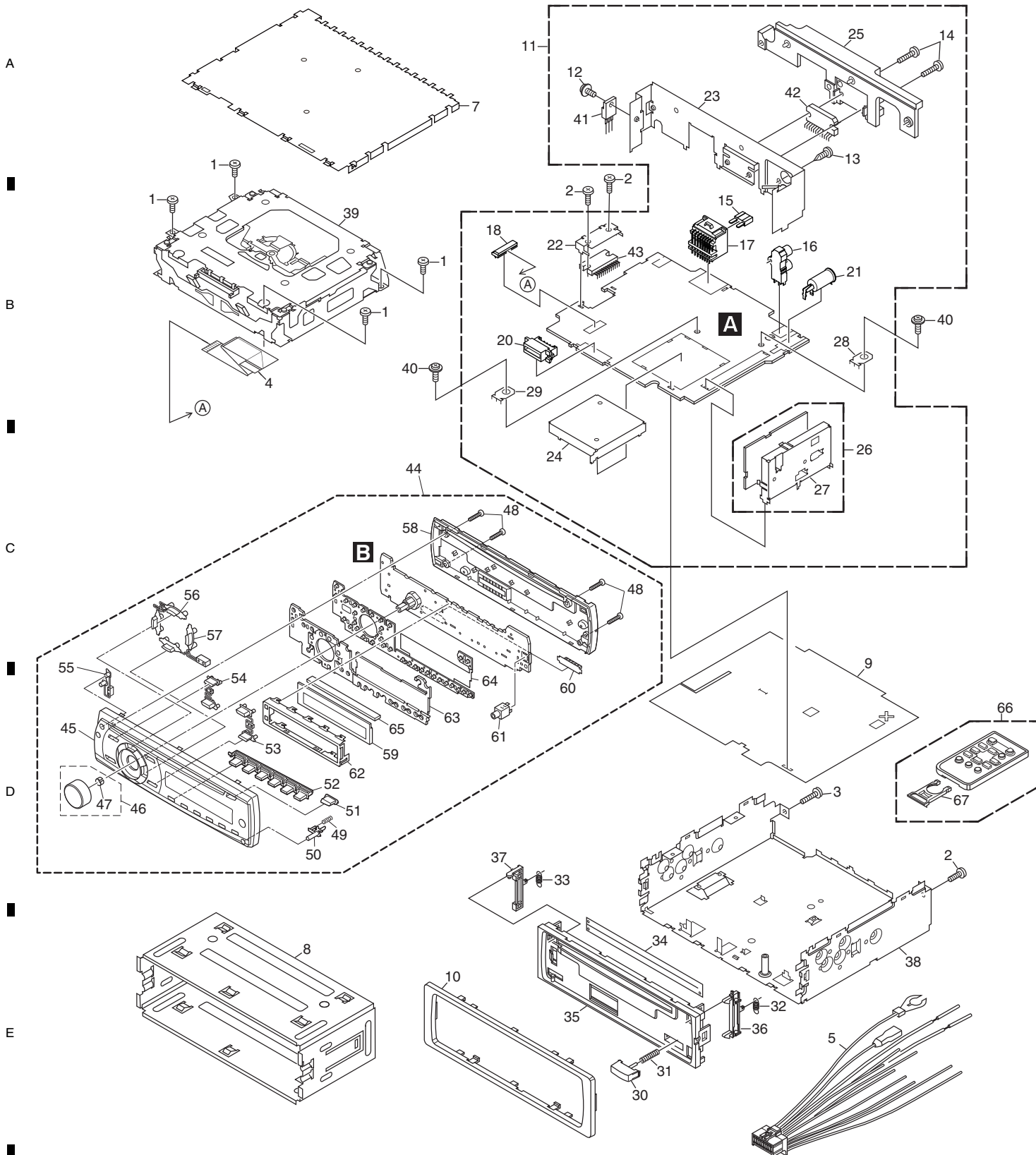
PACKING SECTION PARTS LIST

<u>Mark No.</u>	<u>Description</u>	<u>Part No.</u>	<u>Mark No.</u>	<u>Description</u>	<u>Part No.</u>
1	Cord Assy	CDP1017			
2	Accessory Assy	CEA6708	14	Contain Box(2050MP/XN/ES)	YHL5313
3	*****			Contain Box(2050MPG/XN/ES)	YHL5314
4	Screw Assy	CEA3849		Contain Box(2050MPG/XN/ES1)	YHL5336
5	Screw	CBA1650	15	Protector	YHP5039
*	6 Polyethylene Bag	CEG-127	16	Protector	YHP5040
7	Screw	CRZ50P090FTC	17-1	Installation Manual	YRD5147
8	Screw	TRZ50P080FTC	17-2	Owner's Manual	YRD5145
9	Polyethylene Bag	CEG1160	17-3	Warranty Card	CRY1310
10	Handle	CND3707	*	17-4 Warranty Card(2050MPG/XN/ES1)	CRY1250
11	Bush	CNV3930	*	17-5 Service Network(2050MPG/XN/ES1)	CRY1251
12	Polyethylene Bag	CEG1373	18	Case Assy	YXB5009
13	Unit Box(2050MP/XN/ES)	YHG5313	*	19 Battery	CEX1065
	Unit Box(2050MPG/XN/ES)	YHG5314	20	Remote Control Assy	CXC5719
	Unit Box(2050MPG/XN/ES1)	YHG5336			

Owner's Manual,Installation Manual

Part No.	Language
YRD5145, YRD5147	English, Spanish, Portuguese(B), Traditional Chinese

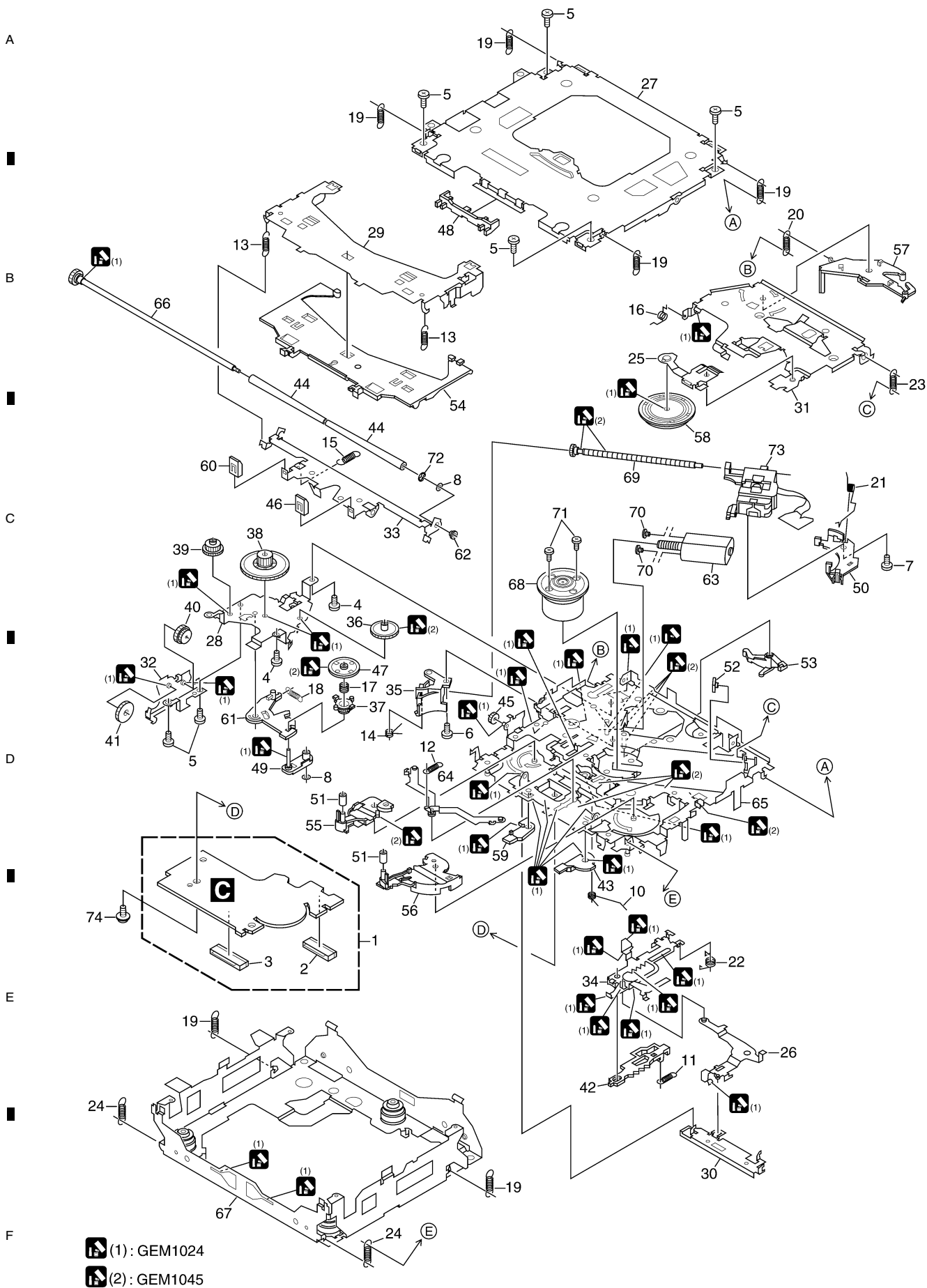
9.2 EXTERIOR



EXTERIOR SECTION PARTS LIST

Mark No.	Description	Part No.	Mark No.	Description	Part No.	
1	Screw	BSZ26P060FTC	46	Knob Unit	YXC5072	
2	Screw	BSZ26P100FTC	47	Spring	YBL5010	
3	Screw	BSZ26P180FTC	48	Screw	BPZ20P100FTC	A
4	Cable	CDE8336	49	Spring	CBH2210	
5	Cord Assy	CDP1017				
6	.....		50	Button(Detach)	YAC5217	
7	Case	CNB2793	51	Button(EJECT)	YAC5218	
8	Holder	CND3598	52	Button(1 - 6)	YAC5219	
9	Insulator	CNN23255	53	Button(AUDIO,EQ)	YAC5220	
10	Panel	YNS5276	54	Button(FUNC,BAND)	YAC5221	
11	Tuner Amp Unit	YWM5234	55	Button(DISP,CLK)	YAC5222	
12	Screw	BSZ26P060FTC	56	Button(UP,<)	YAC5234	B
13	Screw	BPZ26P080FTC	57	Button(DOWN,>)	YAC5235	
14	Screw	BSZ26P160FTC	58	Cover	YNS5248	
⚠ 15	Fuse(10 A)	YEK5001	59	LCD(LCD1801)	CAW1930	
16	Pin Jack(CN351)	CKB1059	60	Connector(CN1801)	CKS5663	
17	Plug(CN901)	CKM1376	61	Jack(CN1802)	YKN5001	
18	Connector(CN651)	CKS3829	62	Holder	YNC5045	
19	.....		63	Lighting Conductor	YNV5108	
20	Connector(CN831)	CKS5664	64	Rubber Contact	YNV5109	
21	Antenna Jack(CN401)	CKX1056	65	Connector	YNV5166	C
22	Holder	CND3545	66	Remote Control Assy	CXC5719	
23	Holder	CND3754	67	Cover	CNS7068	
24	Holder	CND3706				
25	Heat Sink	CNR1668				
26	FM/AM Tuner Unit	CWE2025				
27	Holder	CND3466				
28	Terminal(CN402)	VNF1084				
29	Terminal(CN601)	VNF1084				
30	Button(DETACH)	CAC4836				D
31	Spring	CBH2367				
32	Spring	CBH2961				
33	Spring	CBH2962				
34	Cover	CNN1665				
35	Panel	CNS9206				
36	Arm	CNV9311				
37	Arm	CNV9312				
38	Chassis Unit	CXC7391				
39	CD Mechanism Module(S10.5)	CXK5763				E
40	Screw	ISS26P055FTC				
41	Transistor(Q991)	2SD2396				
42	IC(IC301)	PAL007C				
43	IC(IC911)	BA4918-V12				
44	Grille Assy(2050MP/XN/ES)	YXA5374				
	Grille Assy(2050MPG/XN/ES)	YXA5367				
	Grille Assy(2050MPG/XN/ES1)	YXA5367				
45	Grille Unit(2050MP/XN/ES)	YXA5334				
	Grille Unit(2050MPG/XN/ES)	YXA5336				F
	Grille Unit(2050MPG/XN/ES1)	YXA5336				

9.3 CD MECHANISM MODULE



CD MECHANISM MODULE SECTION PARTS LIST

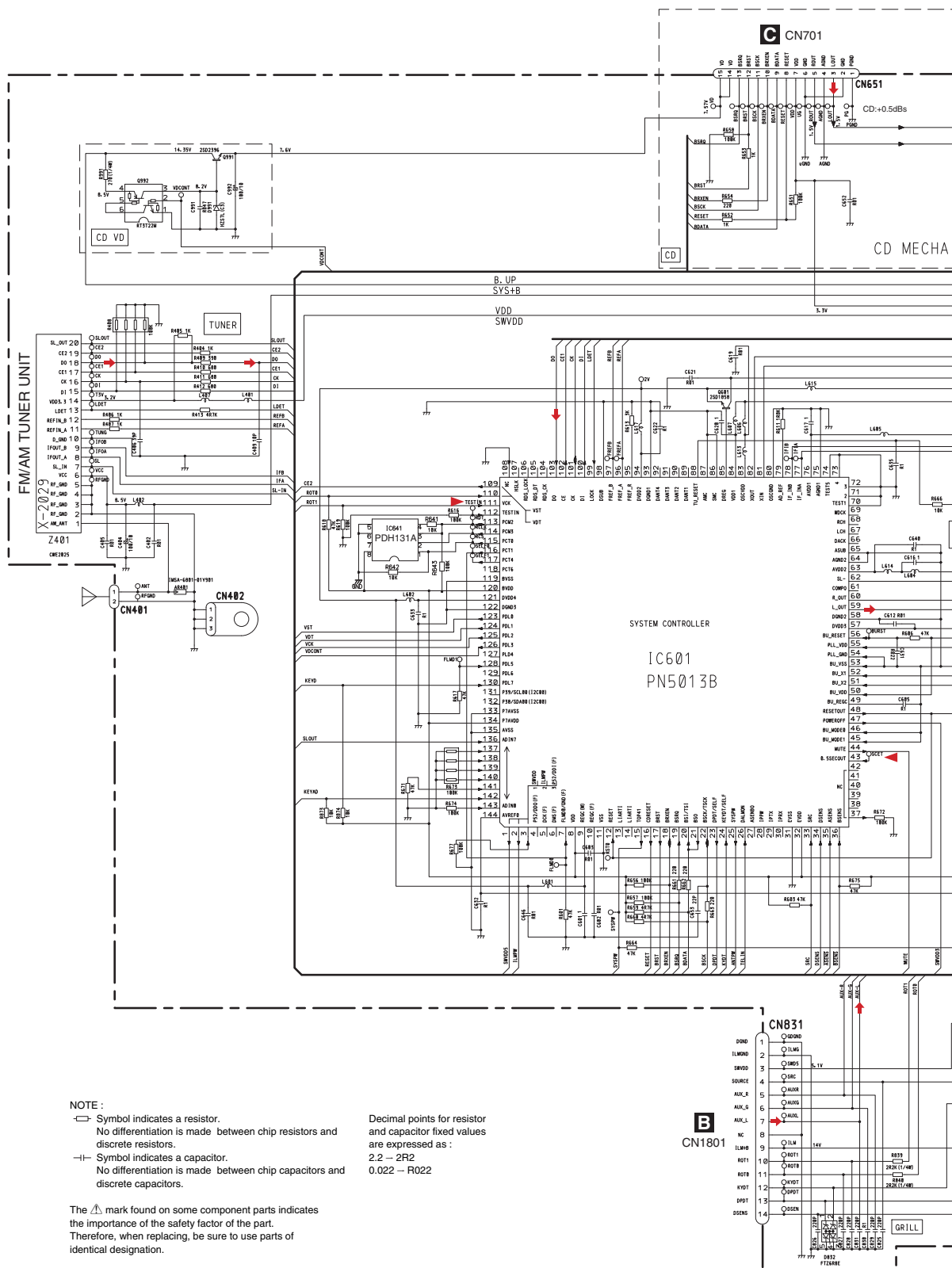
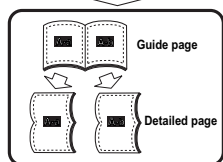
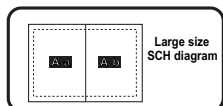
<u>Mark No.</u>	<u>Description</u>	<u>Part No.</u>	<u>Mark No.</u>	<u>Description</u>	<u>Part No.</u>	
1	CD Core Unit(S10.5COMP2)	CWX3514	50	Rack	CNV8342	
2	Connector(CN101)	CKS4182				A
3	Connector(CN701)	CKS4808	51	Roller	CNV8343	
4	Screw	BMZ20P025FTC	52	Holder	CNV8344	
5	Screw	BSZ20P040FTC	53	Arm	CNV8345	
			54	Guide	CNV8347	
6	Screw(M2 x 3)	CBA1511	55	Arm	CNV8348	
7	Screw(M2 x 4)	CBA1835				
8	Washer	CBF1038	56	Arm	CNV8349	
9	.....		57	Arm	CNV8350	
10	Spring	CBH2609	58	Clamper	CNV8365	
			59	Arm	CNV8386	
11	Spring	CBH2612	60	Guide	CNV8396	B
12	Spring	CBH2614				
13	Spring	CBH2616	61	Arm	CNV8413	
14	Spring	CBH2617	62	Collar	CNV8938	
15	Spring	CBH2620	63	Motor Unit(M2)	CXC4026	
			64	Arm Unit	CXC4027	
16	Spring	CBH2855	65	Chassis Unit	CXC4028	
17	Spring	CBH2937				
18	Spring	CBH2735	66	Gear Unit	CXC4029	
19	Spring	CBH2854	67	Frame Unit	CXC4031	
20	Spring	CBH2642	68	Motor Unit(M1)	CXC7134	
			69	Screw Unit	CXC6359	C
21	Spring	CBH2856	70	Screw	JFZ20P020FTC	
22	Spring	CBH2857				
23	Spring	CBH2860	71	Screw	JGZ17P022FTC	
24	Spring	CBH2861	72	Washer	YE20FTC	
25	Spring	CBL1686	73	Pickup Unit(P10.5)(Service)	CXX1942	
			74	Screw	IMS26P030FTC	
26	Arm	CND1909				
27	Frame	CND2582				
28	Bracket	CND2583				
29	Arm	CND2584				
30	Lever	CND2585				D
31	Arm	CND2586				
32	Bracket	CND2587				
33	Arm	CND2588				
34	Lever	CND2589				
35	Holder	CNV7201				
36	Gear	CNV7207				
37	Gear	CNV7208				
38	Gear	CNV7209				
39	Gear	CNV7210				E
40	Gear	CNV7211				
41	Gear	CNV7212				
42	Rack	CNV7214				
43	Arm	CNV7216				
44	Roller	CNV7218				
45	Gear	CNV7219				
46	Guide	CNV7361				
47	Gear	CNV7595				F
48	Guide	CNV7799				
49	Arm	CNV7805				

10. SCHEMATIC DIAGRAM

10.1 OVERALL CONNECTION DIAGRAM(GUIDE PAGE)

Note: When ordering service parts, be sure to refer to "EXPLODED VIEWS AND PARTS LIST" or "ELECTRICAL PARTS LIST".

A-a



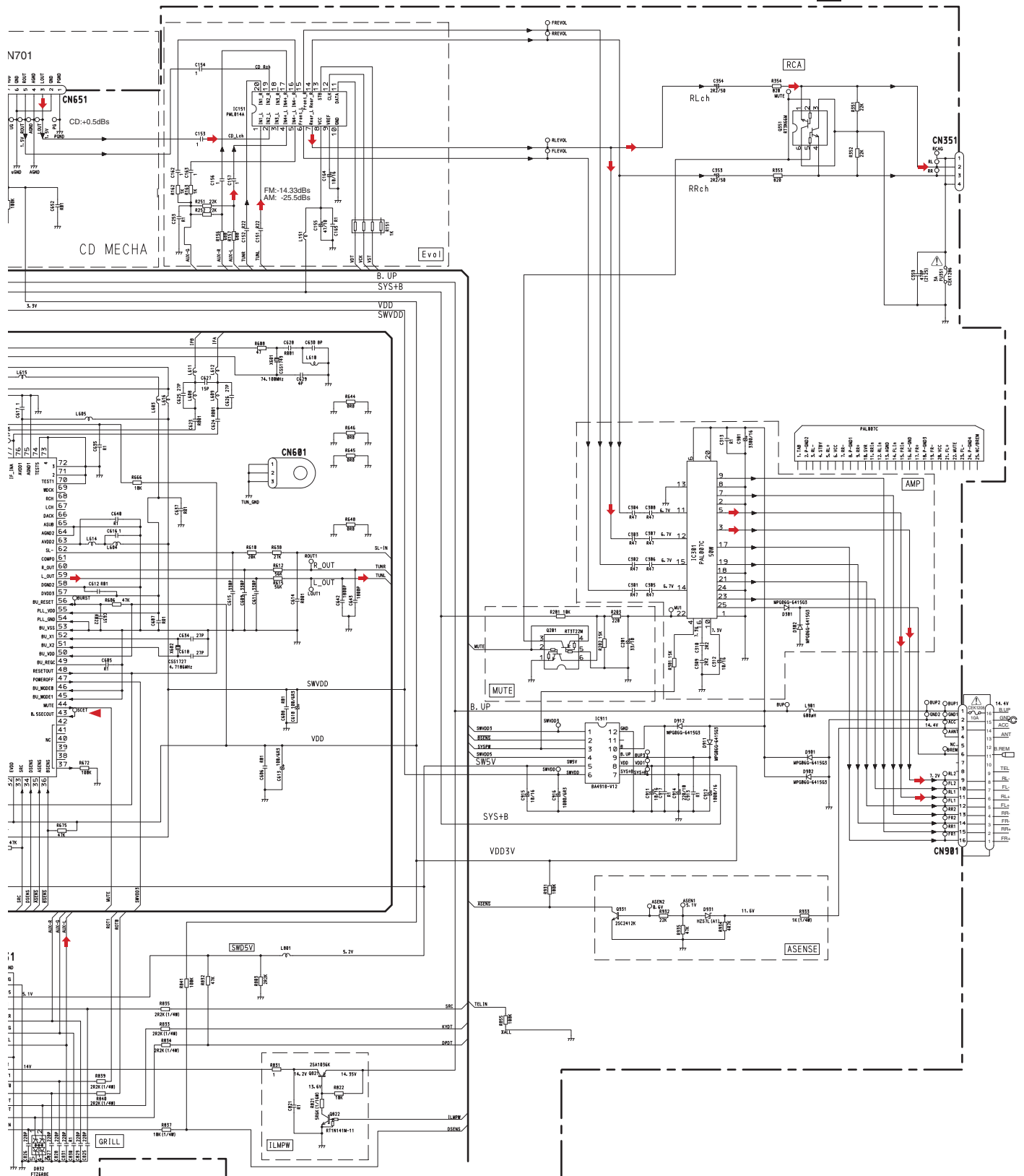
B

CN1801

GRILL

A-b

A TUNER AMP UNIT



A

B

C

D

E

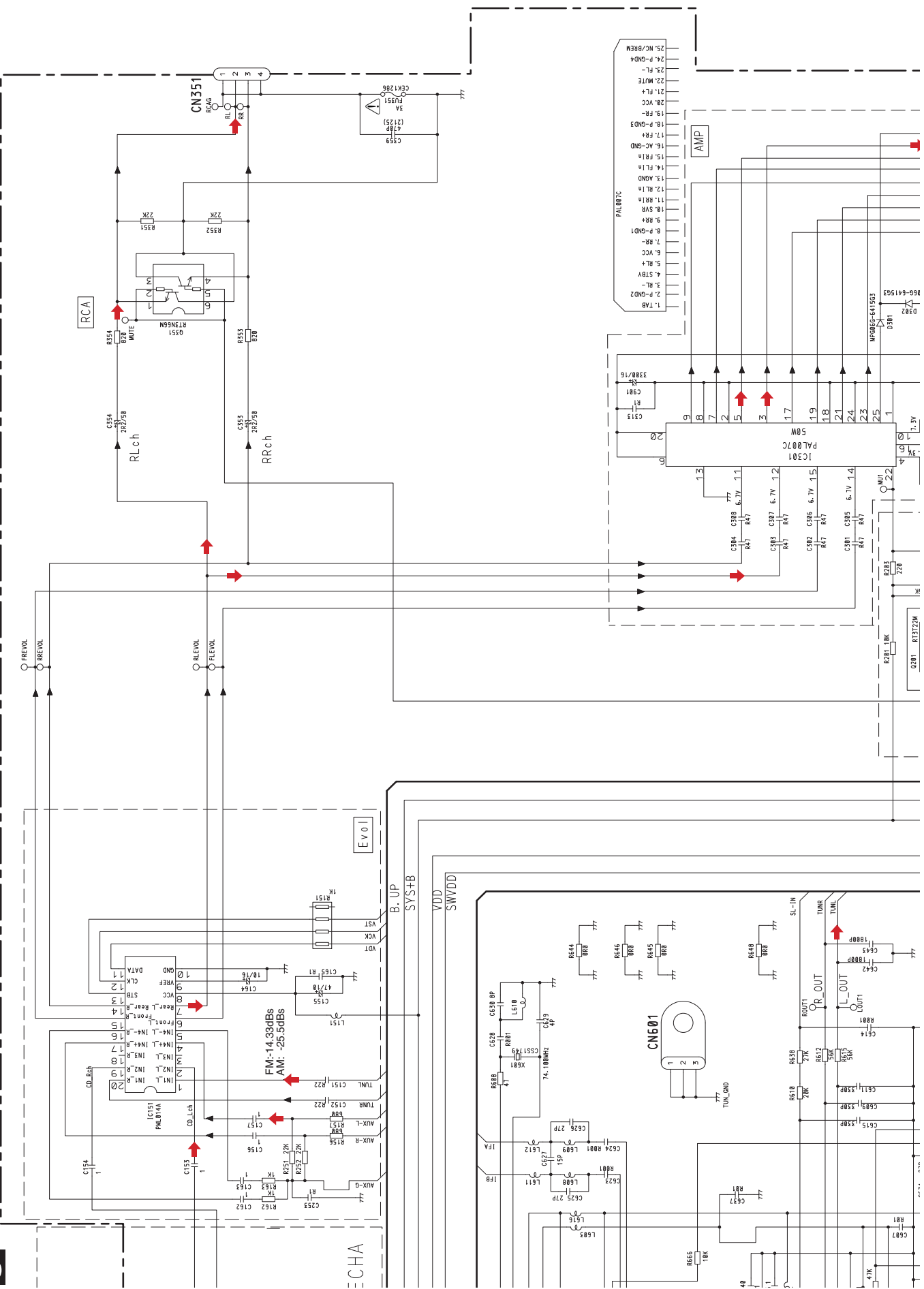
F

A TUNER AMP UNIT

A-a A-b

A-b

DEH-2050MP/XN/ES



A

B

C

D

E

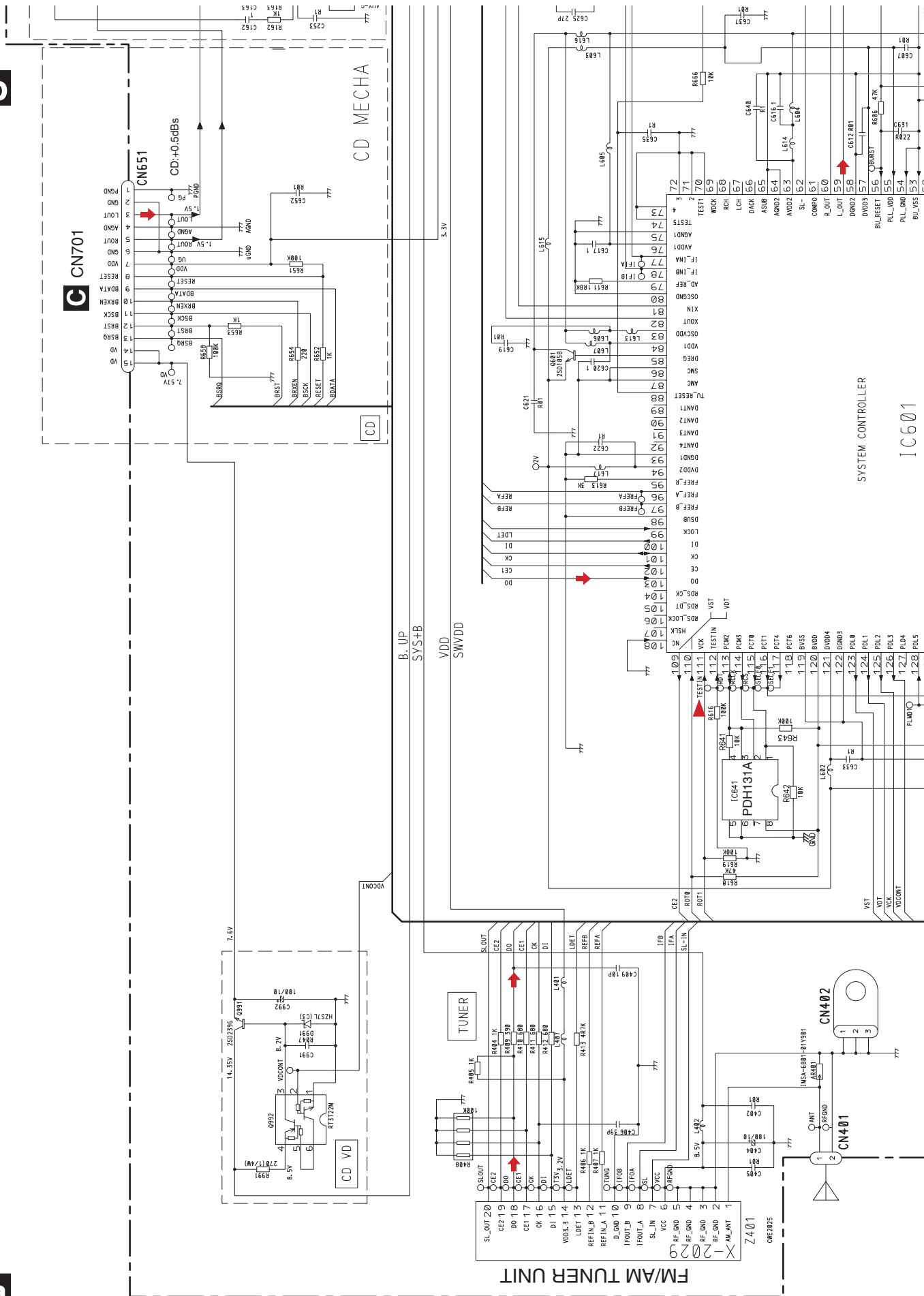
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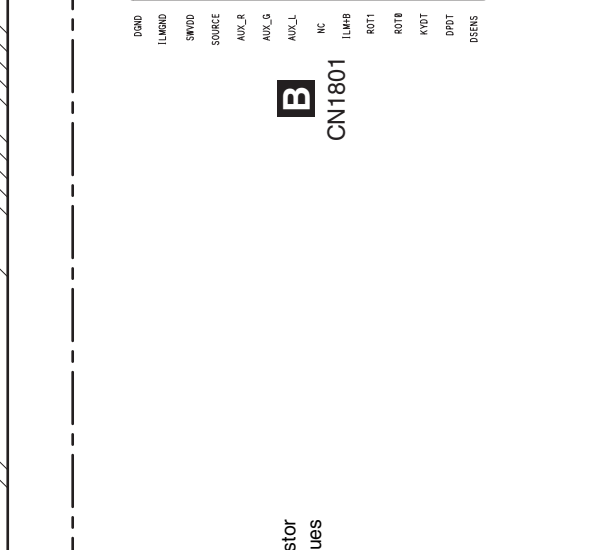
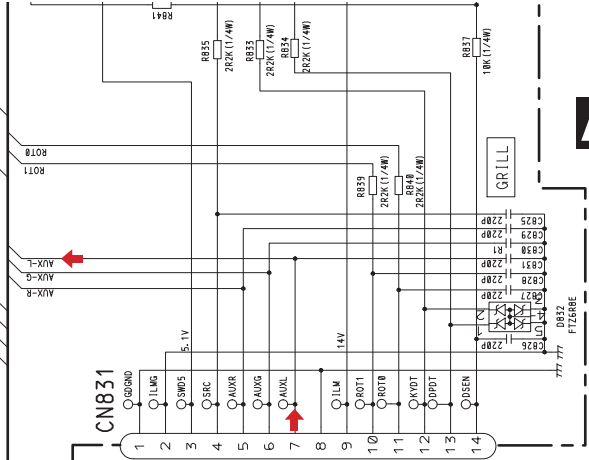
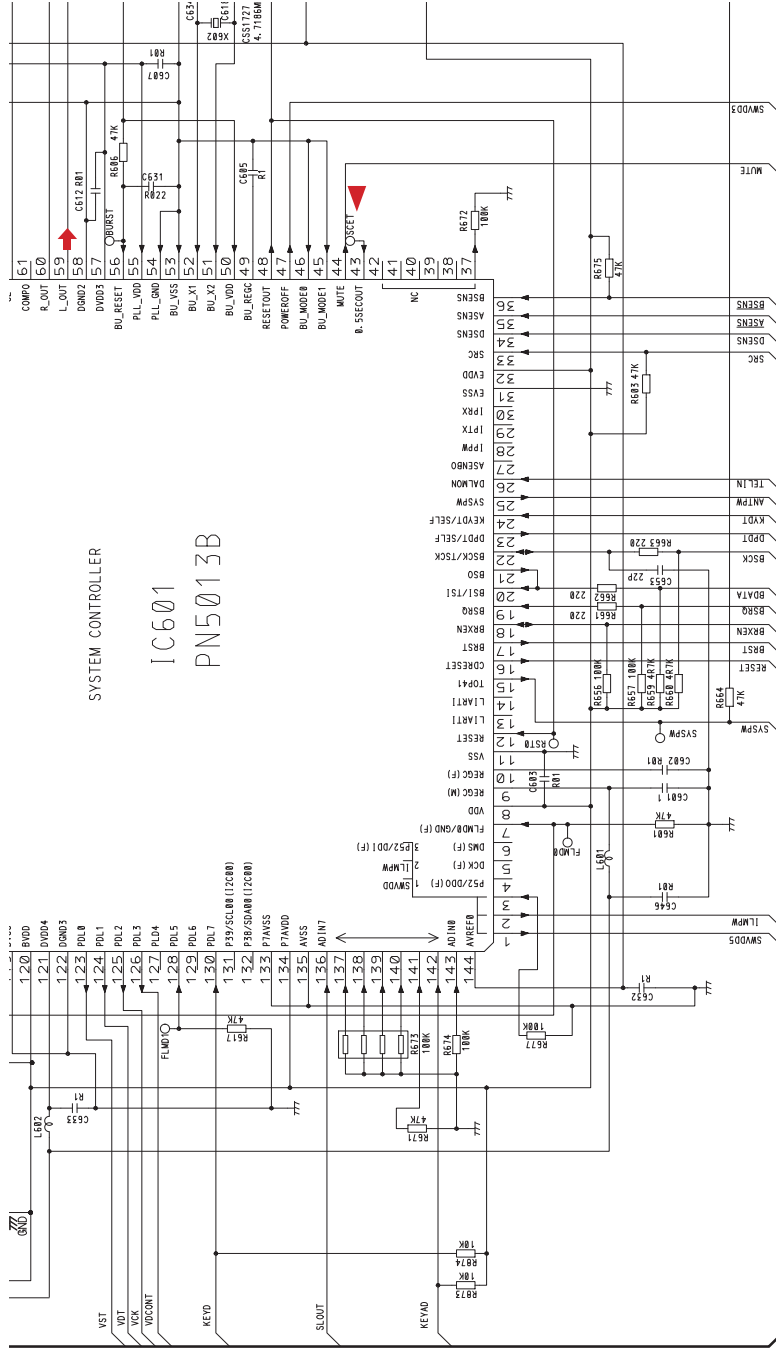
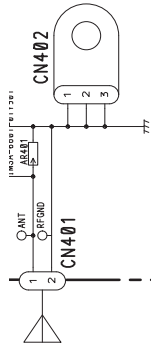
A-b

A-a A-b

A-a

DEH-2050MP/XN/ES





NOTE :

Symbol indicates a resistor.

No differentiation is made between chip resistors and discrete resistors.

Symbol indicates a capacitor.

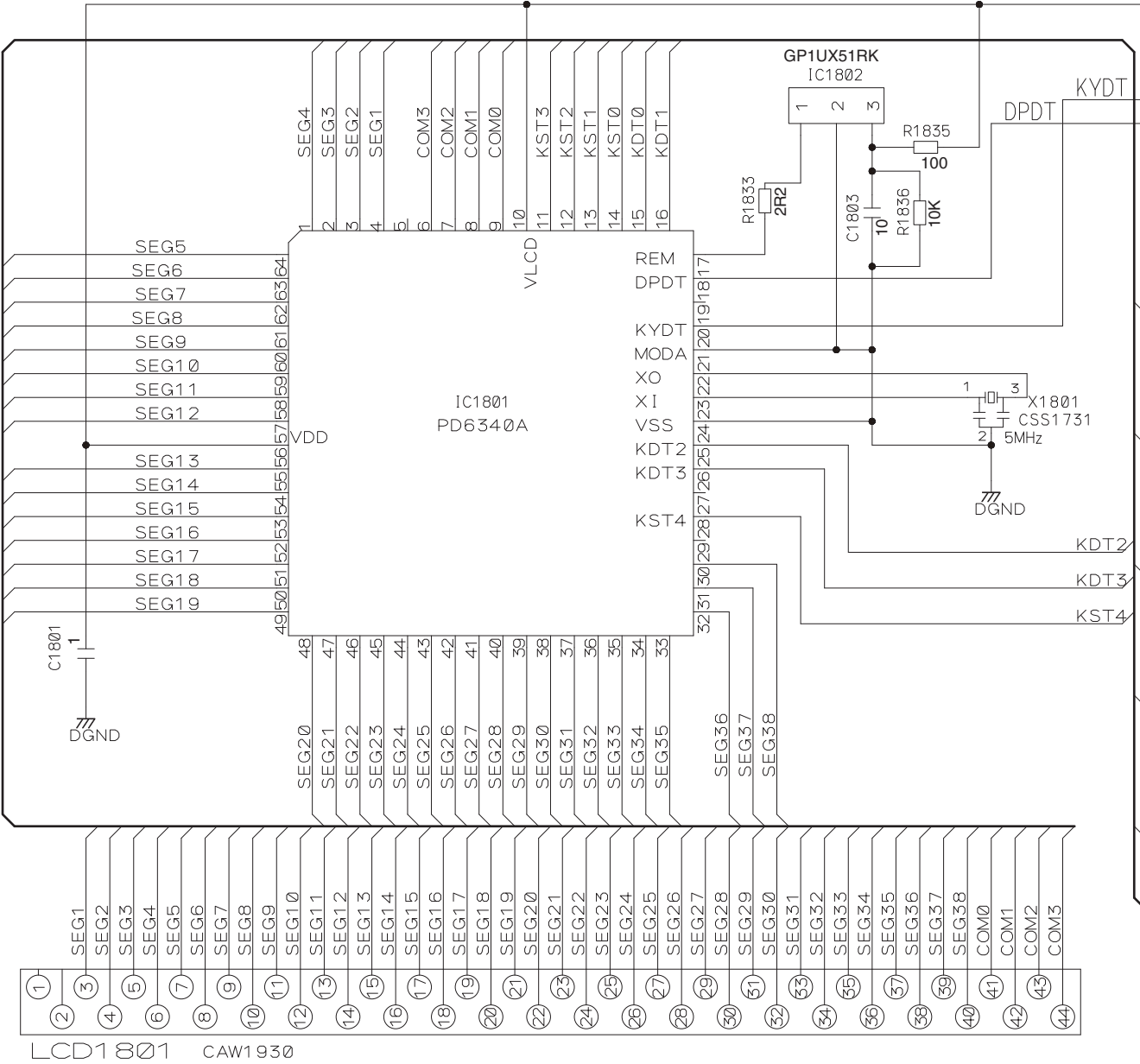
No differentiation is made between chip capacitors and discrete capacitors.

The Δ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.

Decimal points for resistor and capacitor fixed values are expressed as :

2.2 — 2R2
0.022 — R022

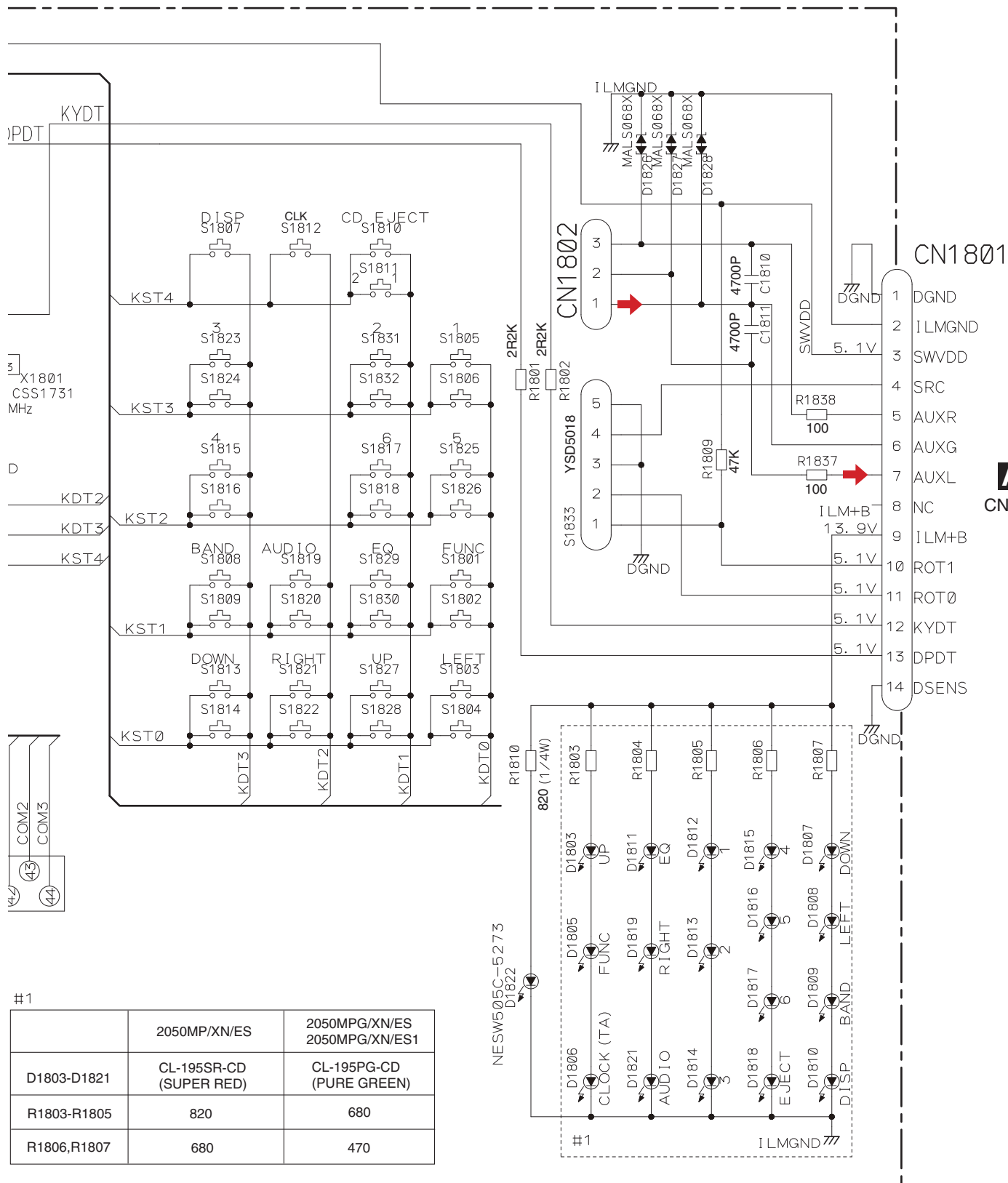
10.2 KEYBOARD UNIT



#1
D1803-D1821
R1803-R1805
R1806,R1807

B

B KEYBOARD UNIT



#1	2050MP/XN/ES	2050MPG/XN/ES 2050MPG/XN/ES1
D1803-D1821	CL-195SR-CD (SUPER RED)	CL-195PG-CD (PURE GREEN)
R1803-R1805	820	680
R1806,R1807	680	470

△

A



C

D

F

F

40

A

E

C

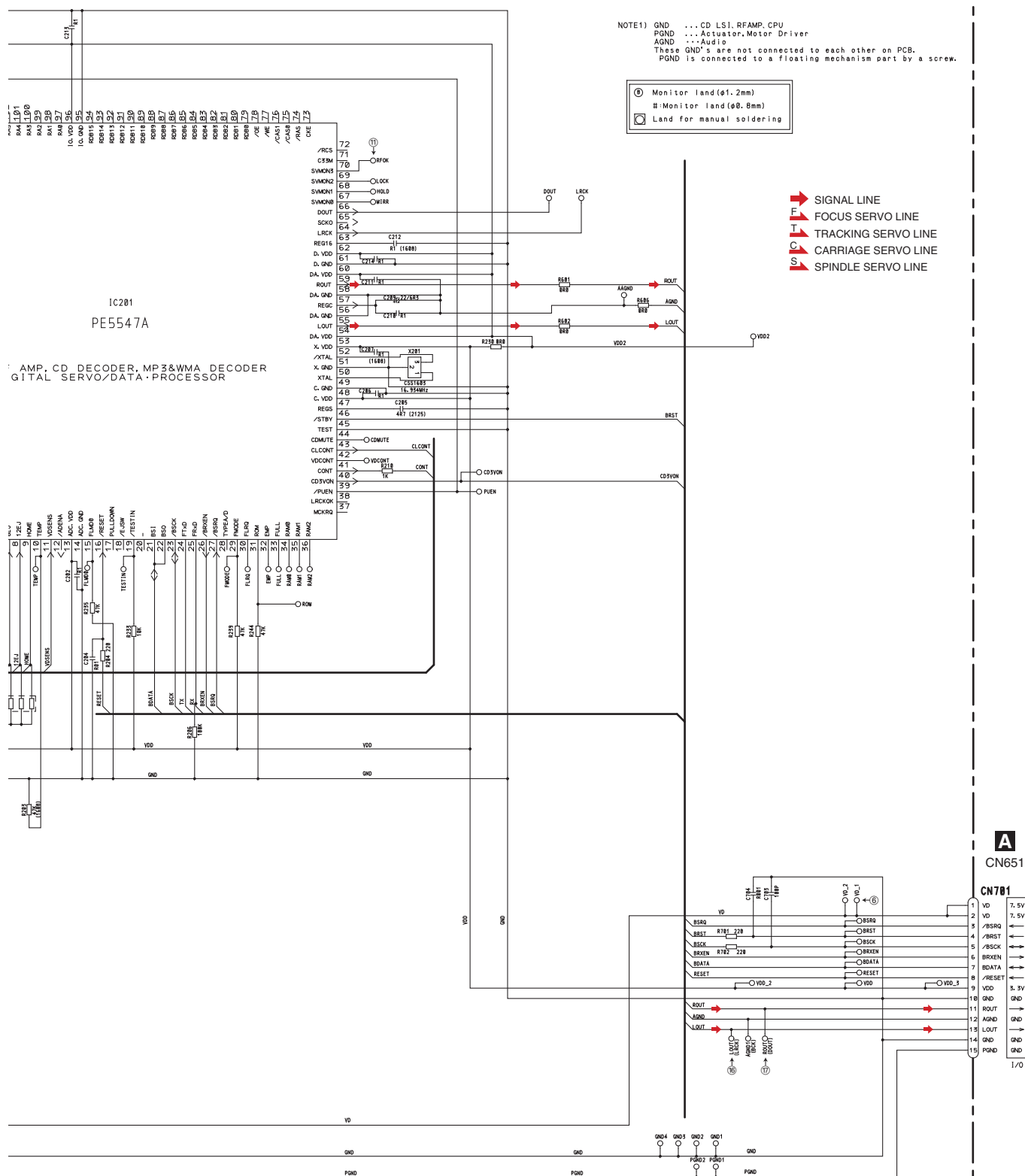
□

F

F

149

41

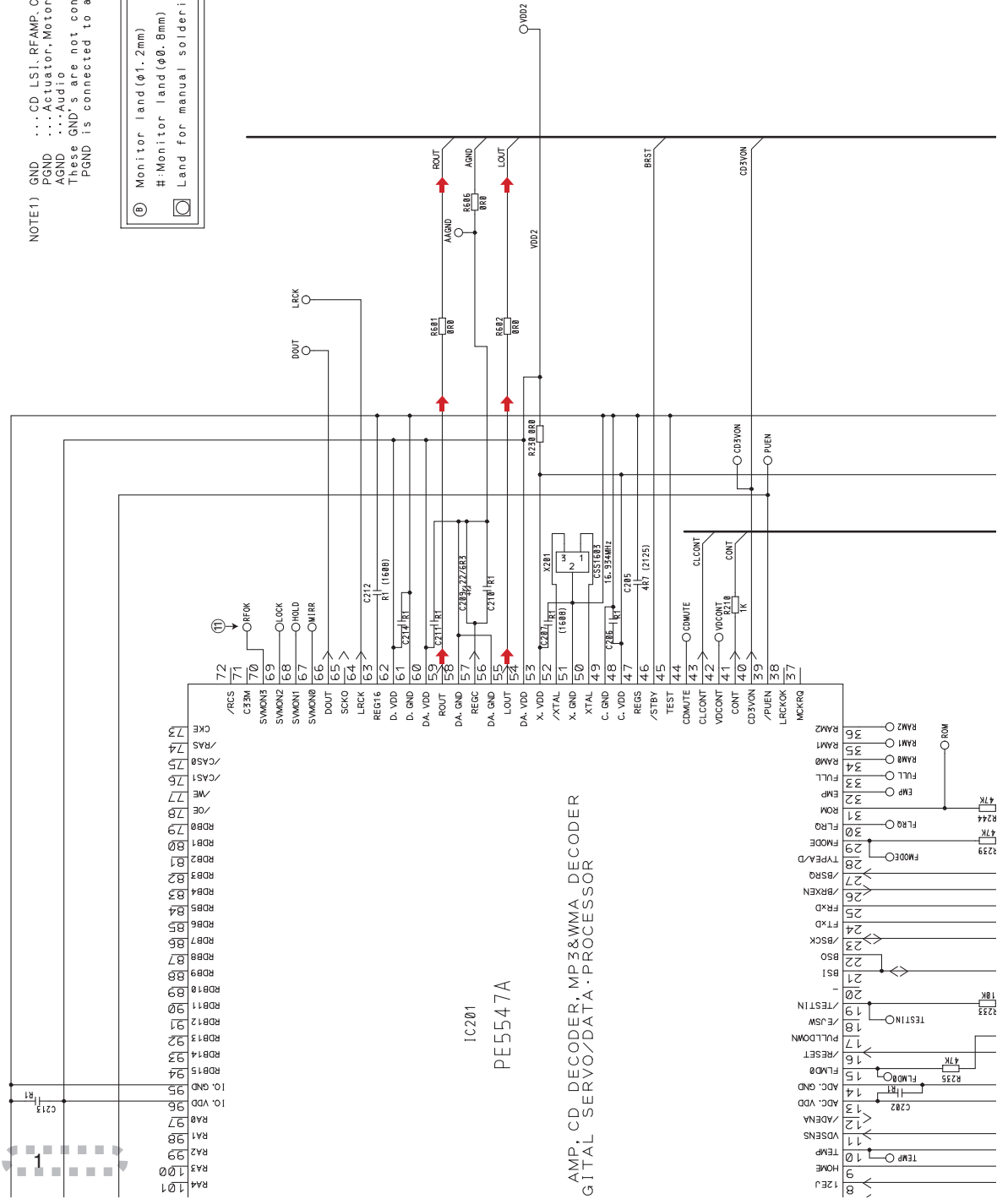


CD CORE UNIT(S10.5COMP2)

NOTE1) GND ...CD LSI, RFAMP, CPU
PGND ...Actuator, Motor Driver
AGND ...Audio
These GND's are not connected to each other on PCB.
PGND is connected to a floating mechanism part by a screw.

⑨ Monitor land (φ1.2mm)
#:Monitor land (φ0.8mm)
Land for manual soldering

↑ SIGNAL LINE
↑ FOCUS SERVO LINE
↑ TRACKING SERVO LINE
↑ CARRIAGE SERVO LINE
↑ SPINDLE SERVO LINE



C-a C-b

C-b

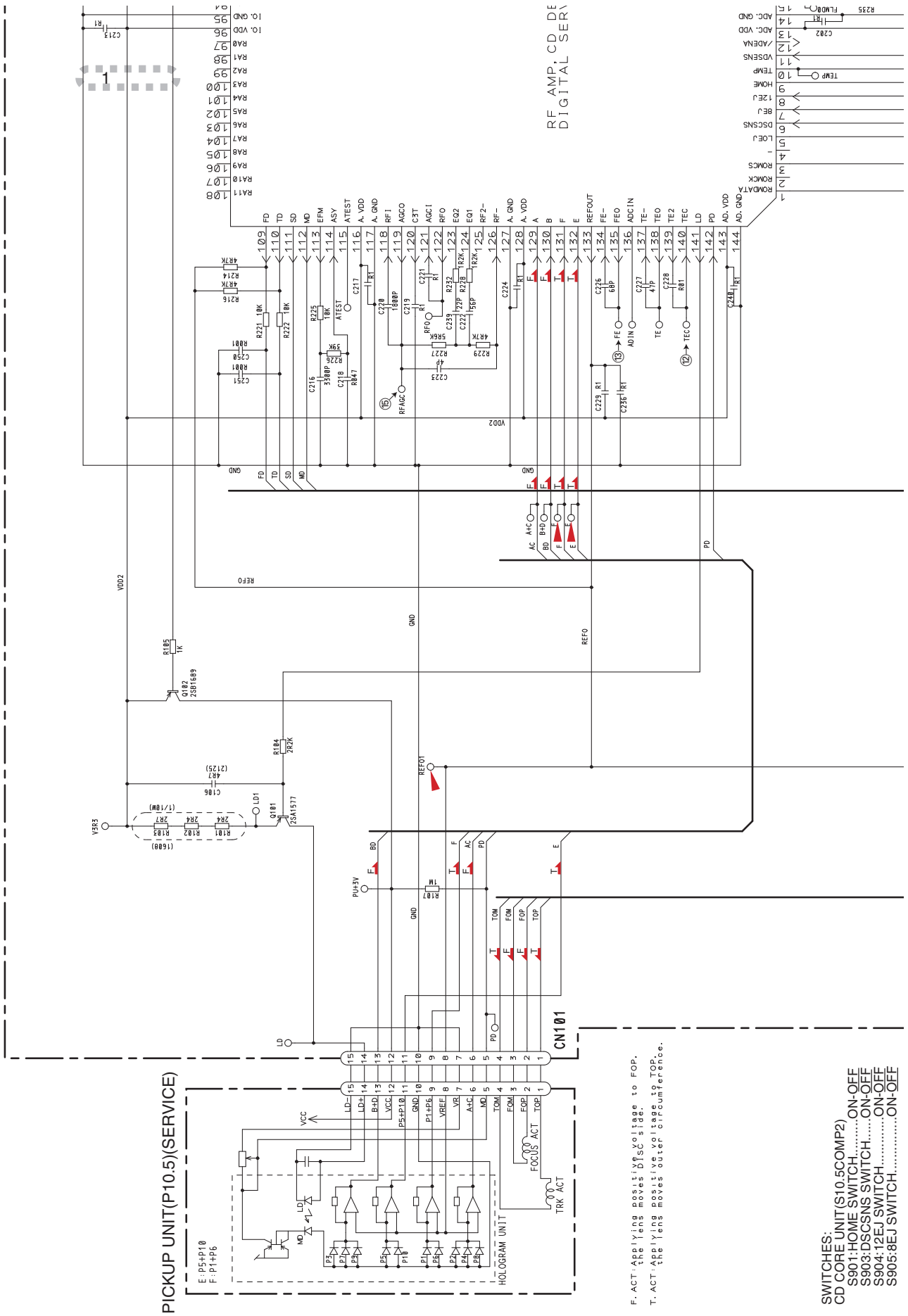
A B C D E F

C-b

C-a C-b

C-a

1 2 3 4



F. ACT: Applying positive voltage to FOP.
T. ACT: Applying positive voltage to TOP.

SWITCHES:
CD CORE UNIT (S10.5COMP2) ON-OFF
S901:HOME SWITCH.....ON-OFF
S903:DSCSNS SWITCH.....ON-OFF
S904:12EJ SWITCH.....ON-OFF
S905:8EJ SWITCH.....ON-OFF

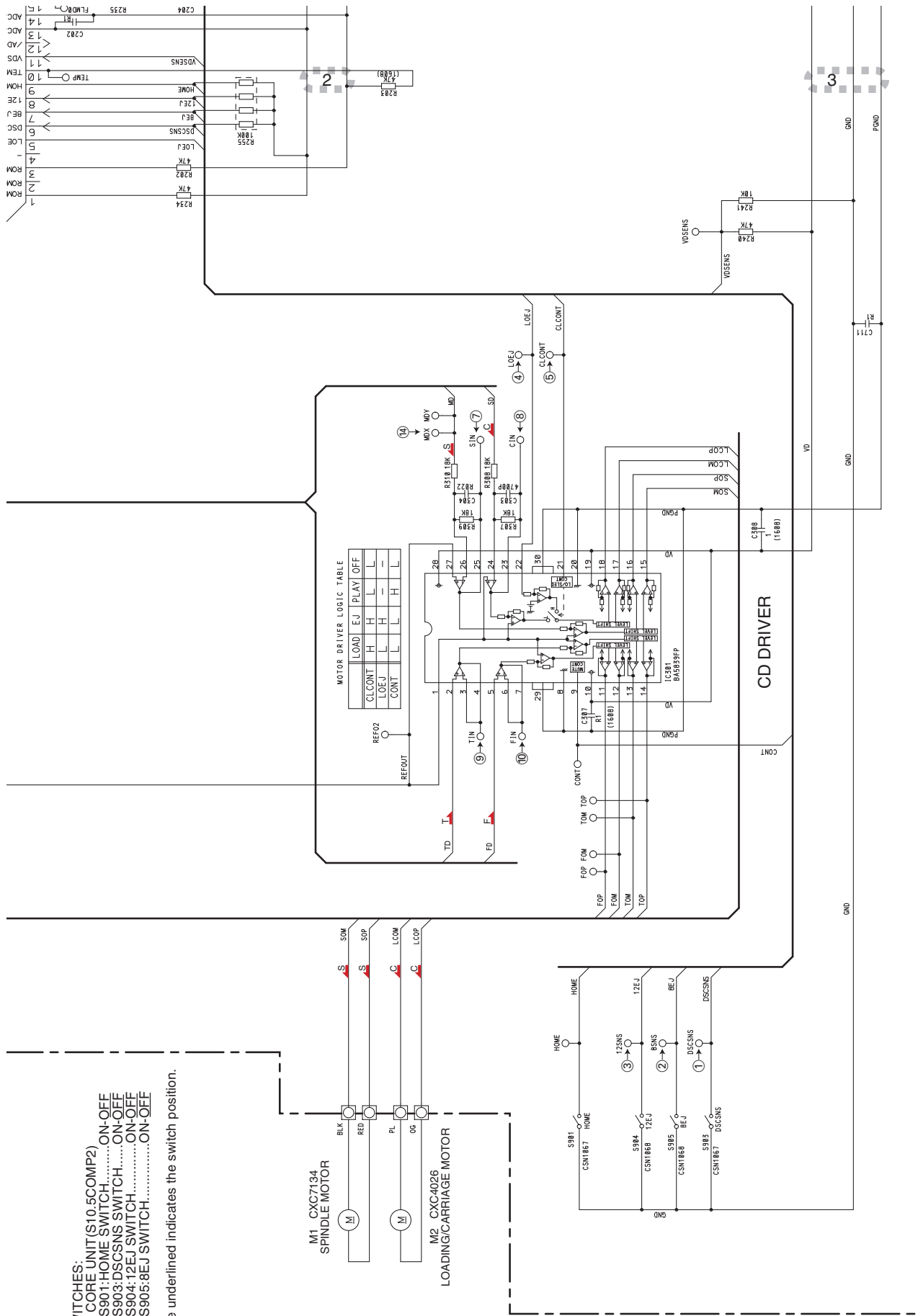
1 2 3 4

SWITCHES:
 CD CORE UNIT(S10.5COMP2)
 S901:HOME SWITCH.....ON-OFF
 S903:DSCSNS SWITCH.....ON-OFF
 S904:12EJ SWITCH.....ON-OFF
 S905:8EJ SWITCH.....ON-OFF

The underlined indicates the switch position.

M1_CXC7134
 SPINDLE MOTOR

M2_CXC4026
 LOADING/CARRIAGE MOTOR



10.4 WAVEFORMS

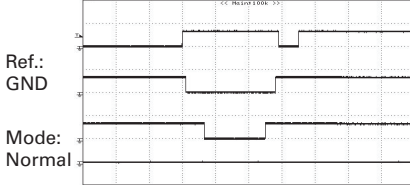
CD Core Unit

Note : 1. The encircled numbers denote measuring points in the circuit diagram.
2. Reference voltage REFO1(1.65 V)

A

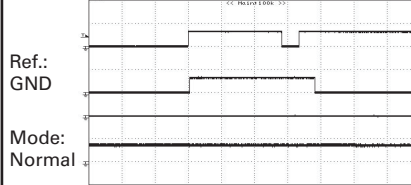
①DSCSNS 5 V/div 500 ms/div
②8SNS 5 V/div
③12SNS 5 V/div
④LOEJ 5 V/div

12 cm CD Loading operation



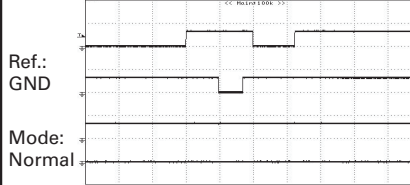
①DSCSNS 5 V/div 500 ms/div
⑤CLCONT 5 V/div
④LOEJ 5 V/div
⑥VD 10 V/div

12 cm CD Loading operation



①DSCSNS 5 V/div 500 ms/div
②8SNS 5 V/div
③12SNS 5 V/div
④LOEJ 5 V/div

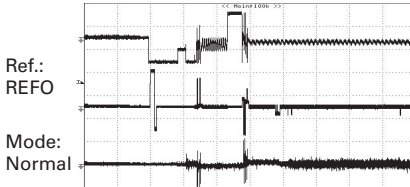
8 cm CD Loading operation



B

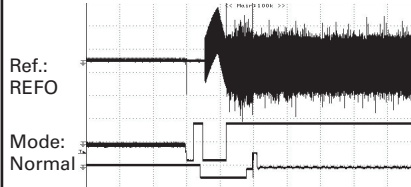
⑦SIN 1 V/div 1 s/div
⑧CIN 500 mV/div
⑨TIN 1 V/div

12 cm CD-DA setup operation after loading



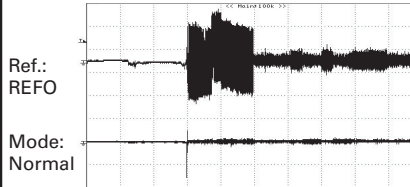
⑩FIN 200 mV/div 500 ms/div
⑪RFOK(MONI_2) 2 V/div
⑦SIN 2 V/div

12 cm CD-DA Source On setup operation



⑫TE 500 mV/div 200 ms/div
⑬FE 500 mV/div

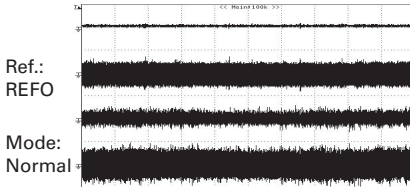
Source On setup operation



C

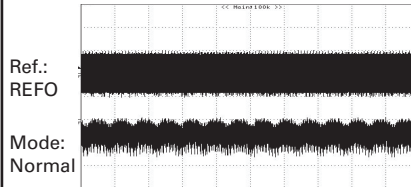
⑬FE 500 mV/div 20 ms/div
⑩FIN 500 mV/div
⑫TE 500 mV/div
⑨TIN 500 mV/div

CD-DA Play operation



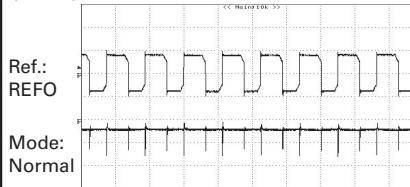
⑭MDX 2 V/div 200 ms/div
⑦SIN 500 mV/div

Spindle waveform during play operation



⑭MDX 2 V/div 5 μs/div
⑦SIN 500 mV/div

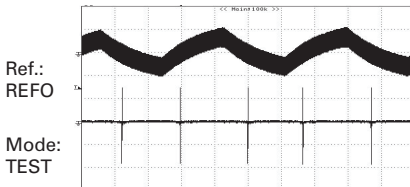
Spindle waveform during play operation (Wider)



D

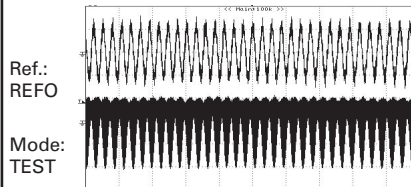
⑩FIN 500 mV/div 200 ms/div
⑬FE 500 mV/div

Focus Search waveform



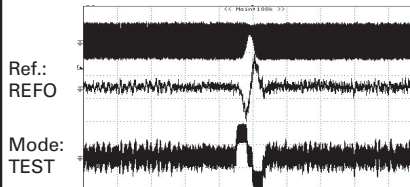
⑫TE 500 mV/div 2 ms/div
⑮RFAGC 500 mV/div

Track Open waveform



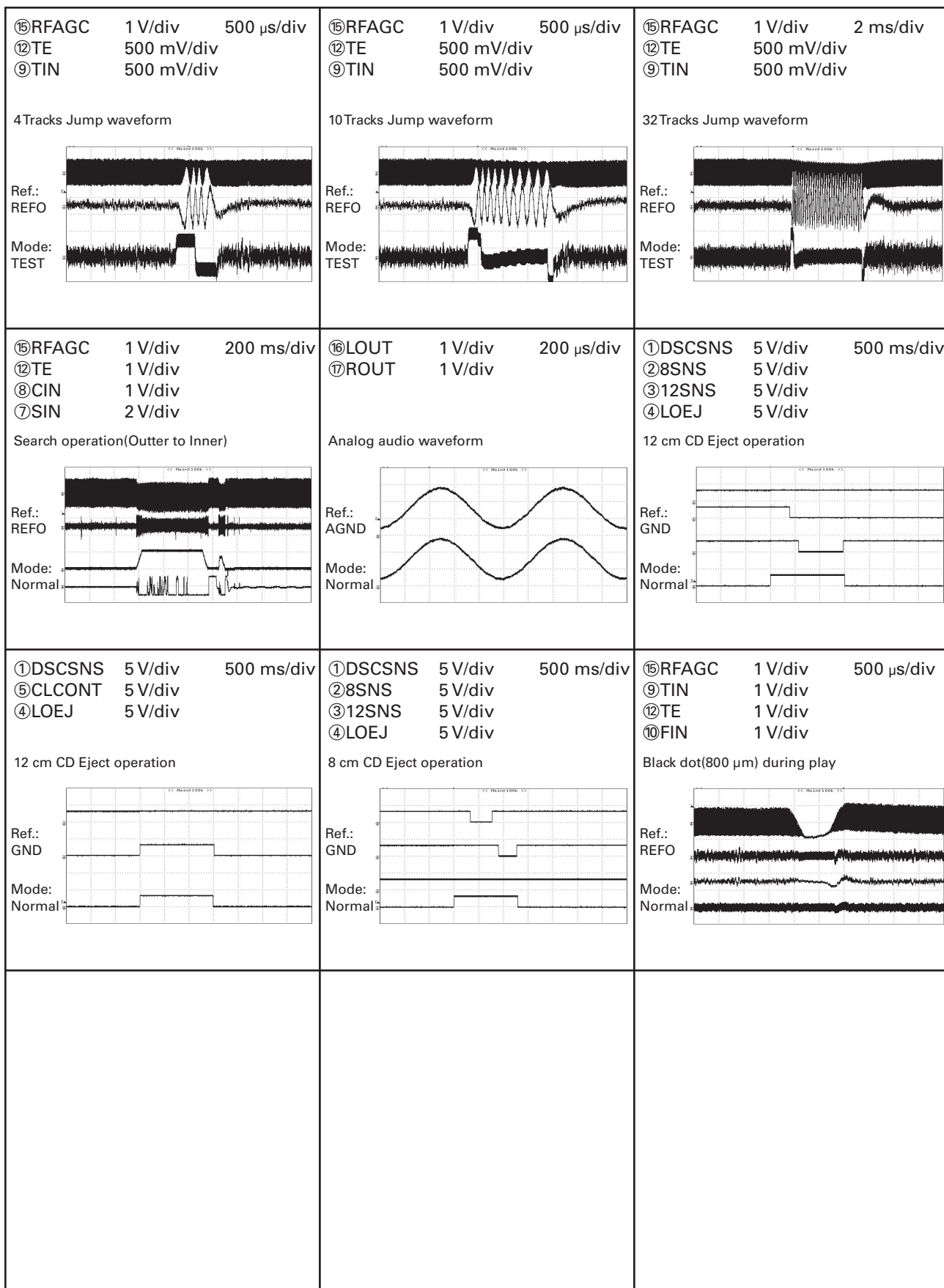
⑮RFAGC 1 V/div 500 μs/div
⑫TE 500 mV/div
⑨TIN 500 mV/div

1 Track Jump waveform



E

F



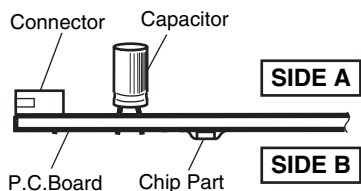
11. PCB CONNECTION DIAGRAM

11.1 TUNER AMP UNIT

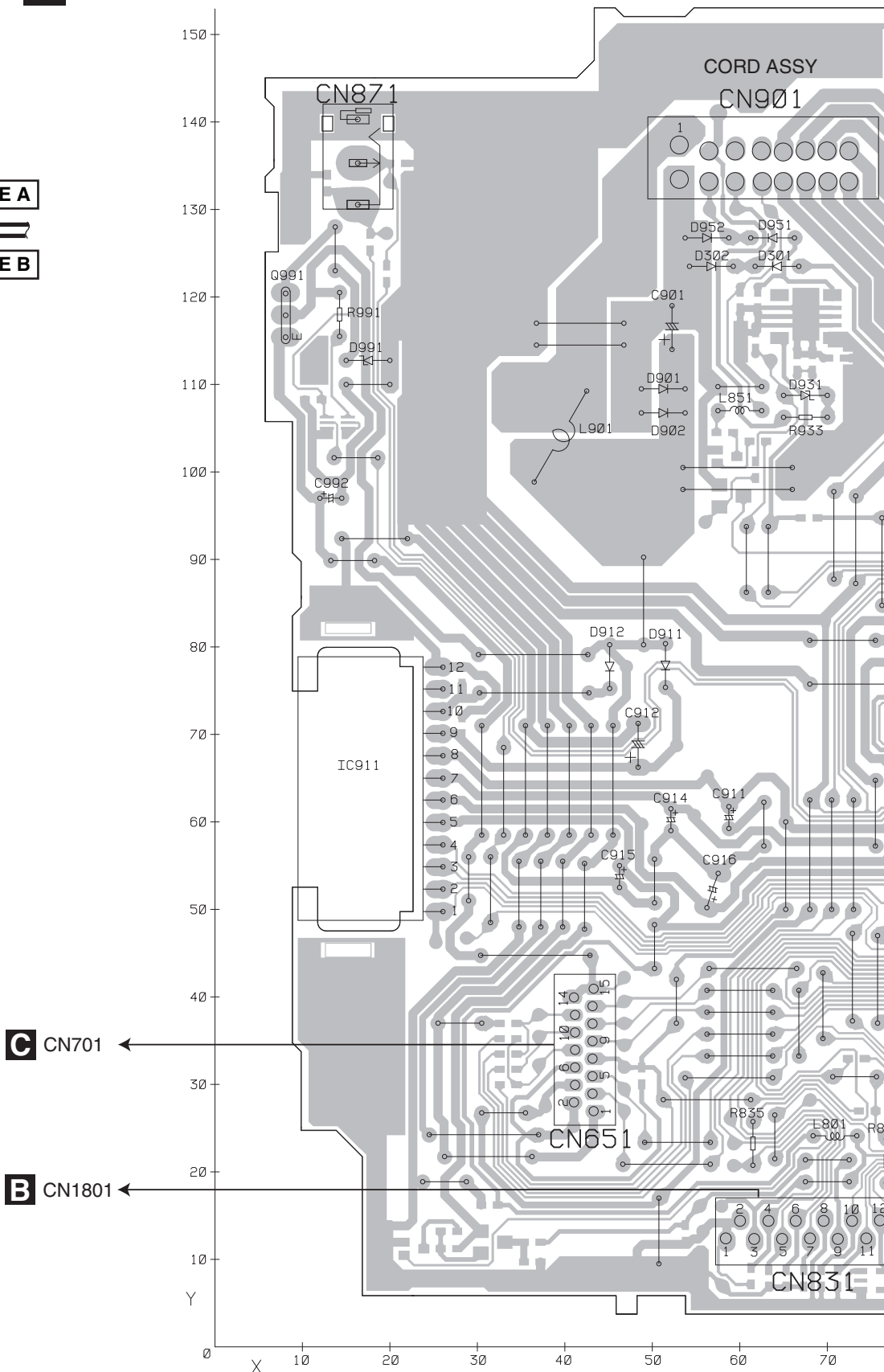
NOTE FOR PCB DIAGRAMS

1. The parts mounted on this PCB include all necessary parts for several destination.
For further information for respective destinations, be sure to check with the schematic diagram.

2. Viewpoint of PCB diagrams

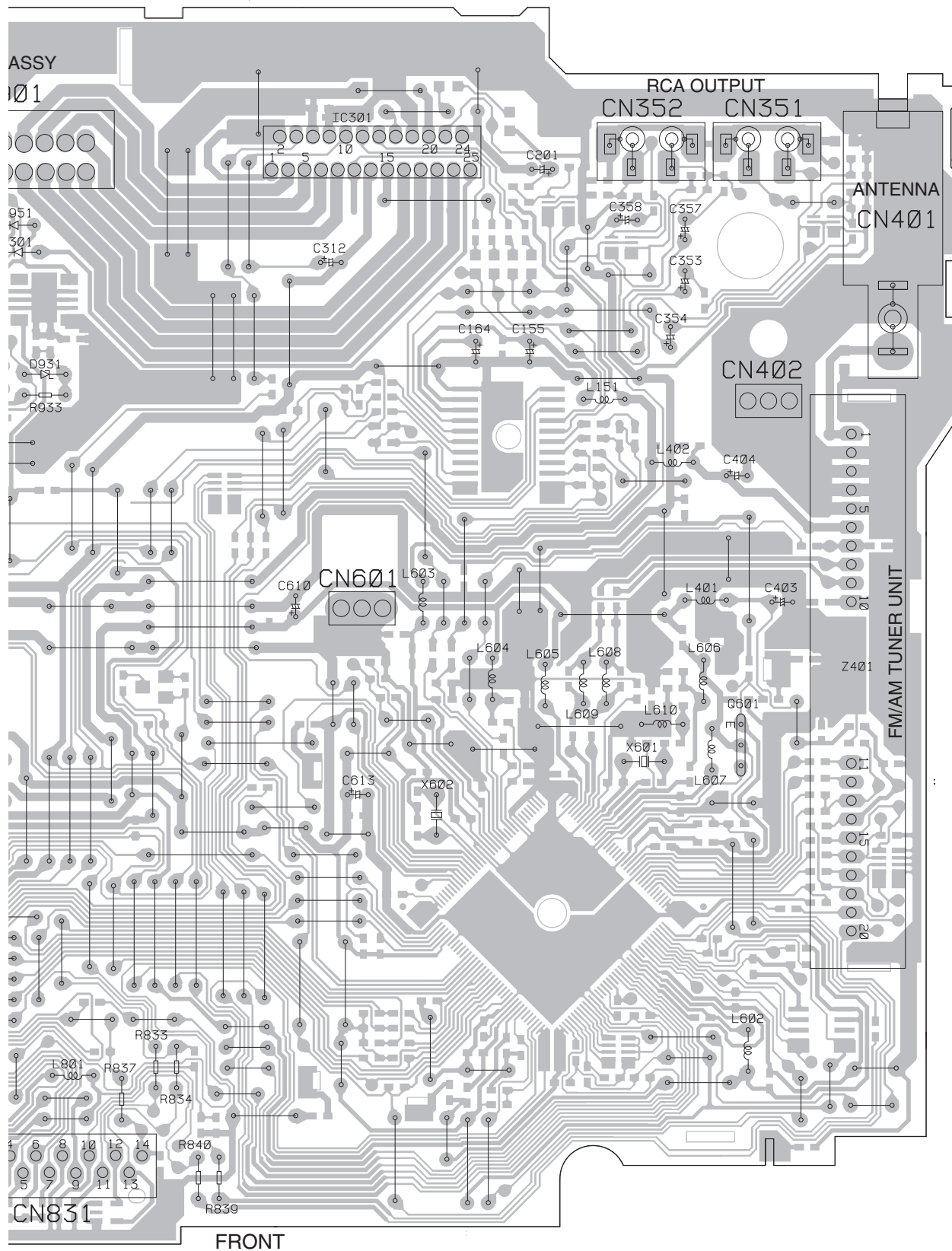


A TUNER AMP UNIT



A

SIDE A



A

A TUNER AMP UNIT

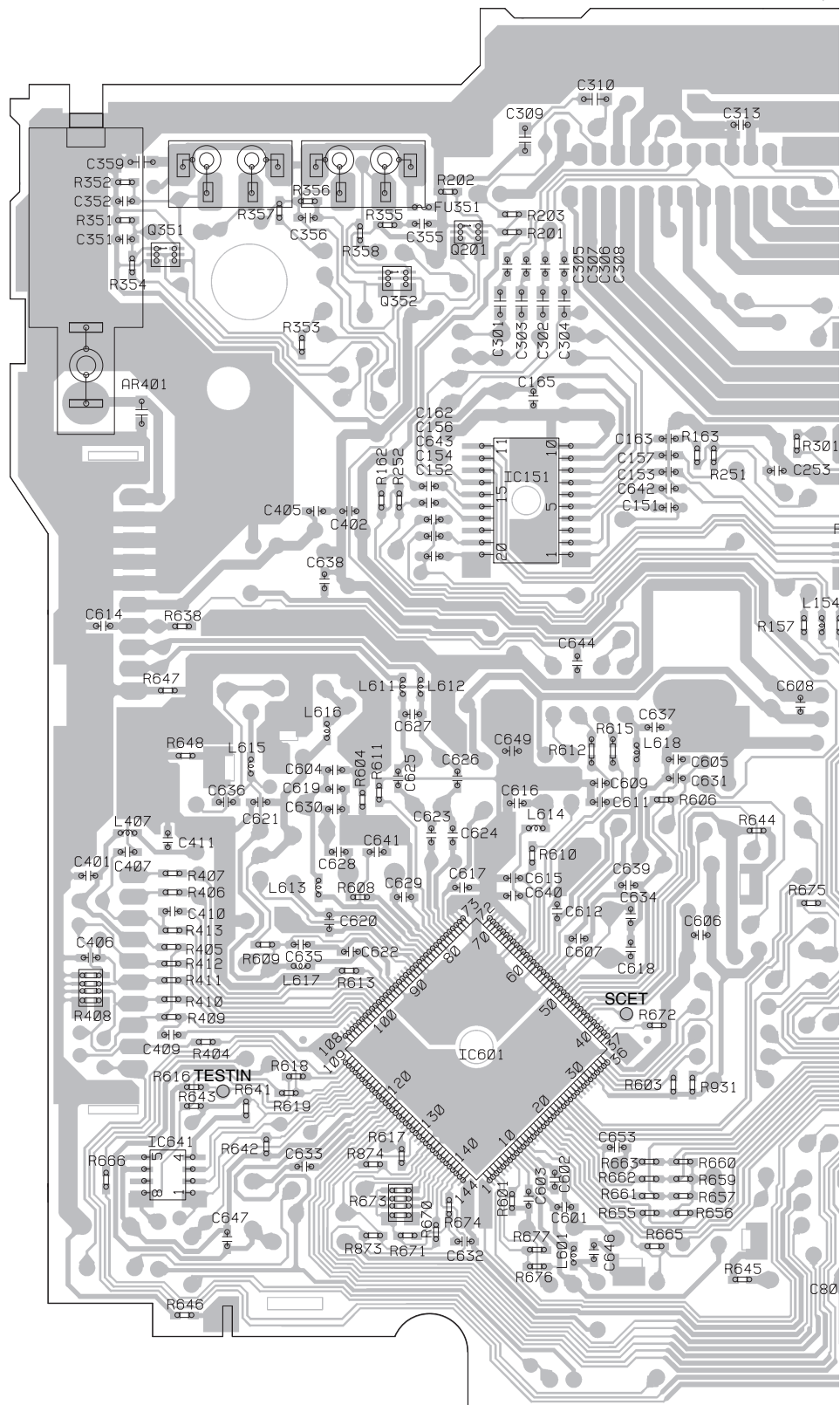
B

C

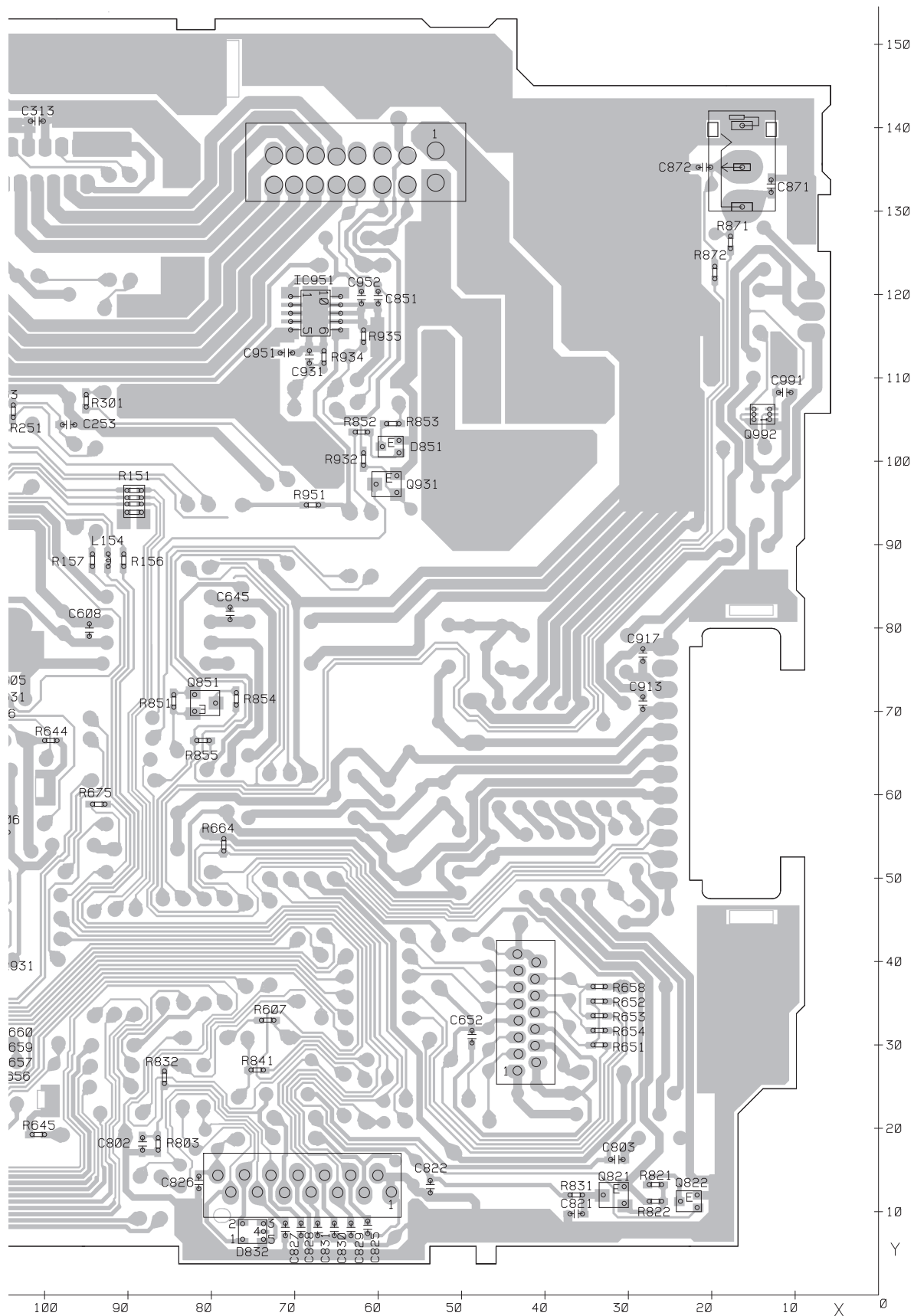
D

E

F



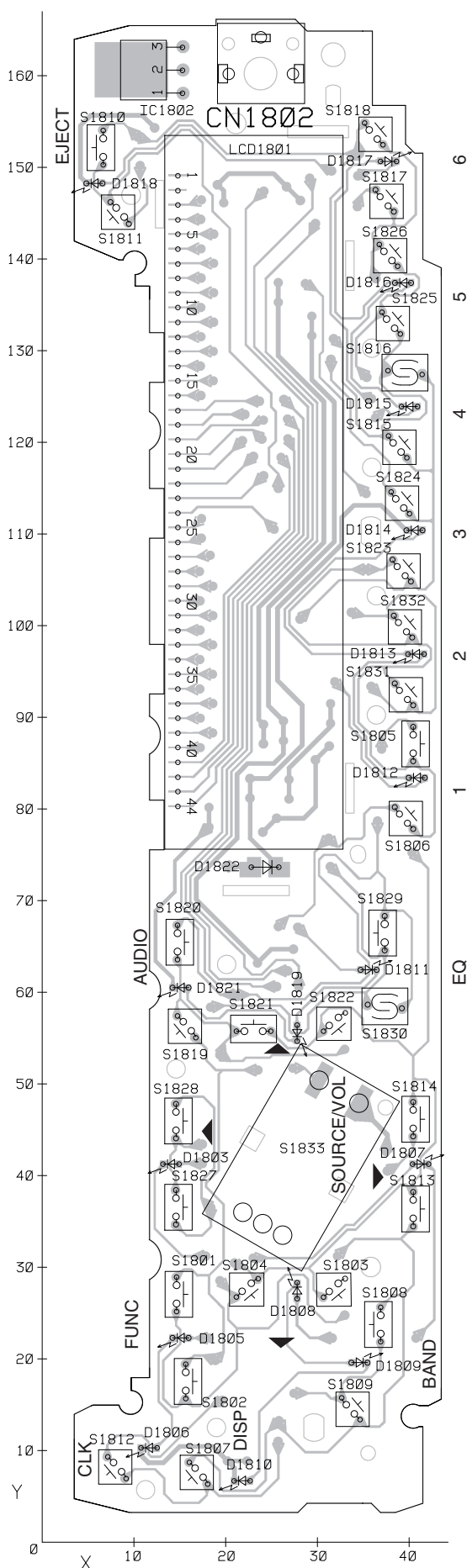
SIDE B



11.2 KEYBOARD UNIT

B KEYBOARD UNIT

SIDE A

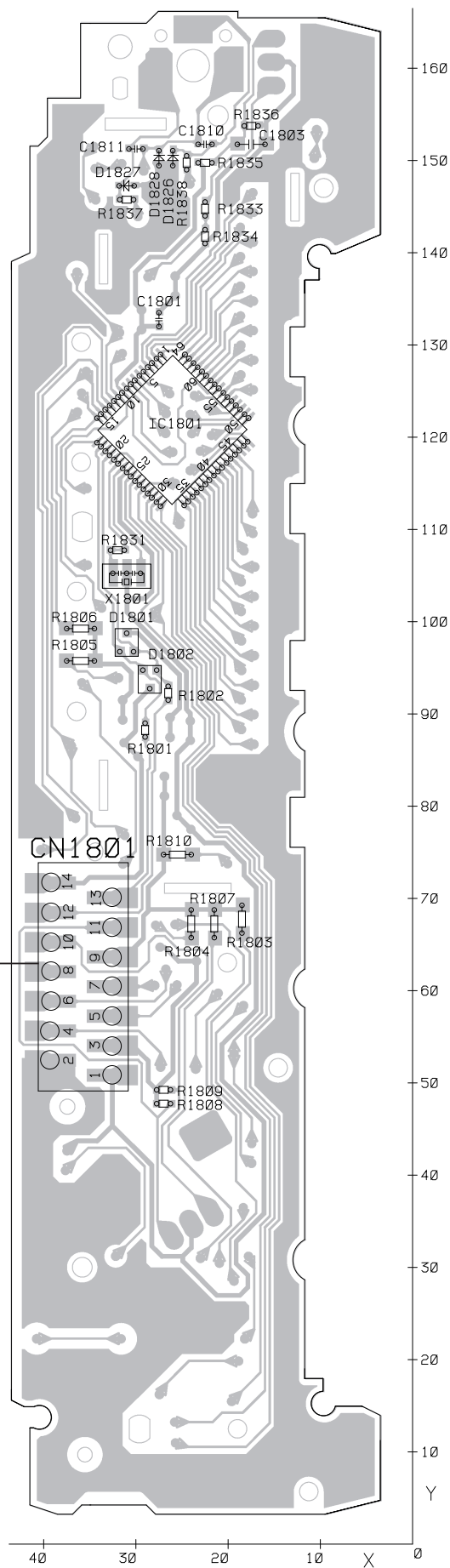


DEH-2050MP/XN/ES

B KEYBOARD UNIT

SIDE B

A
CN831



DEH-2050MP/XN/ES

B

11.3 CD CORE UNIT(S10.5COMP2)

C CD CORE UNIT(S10.5COMP2)

SIDE A

A

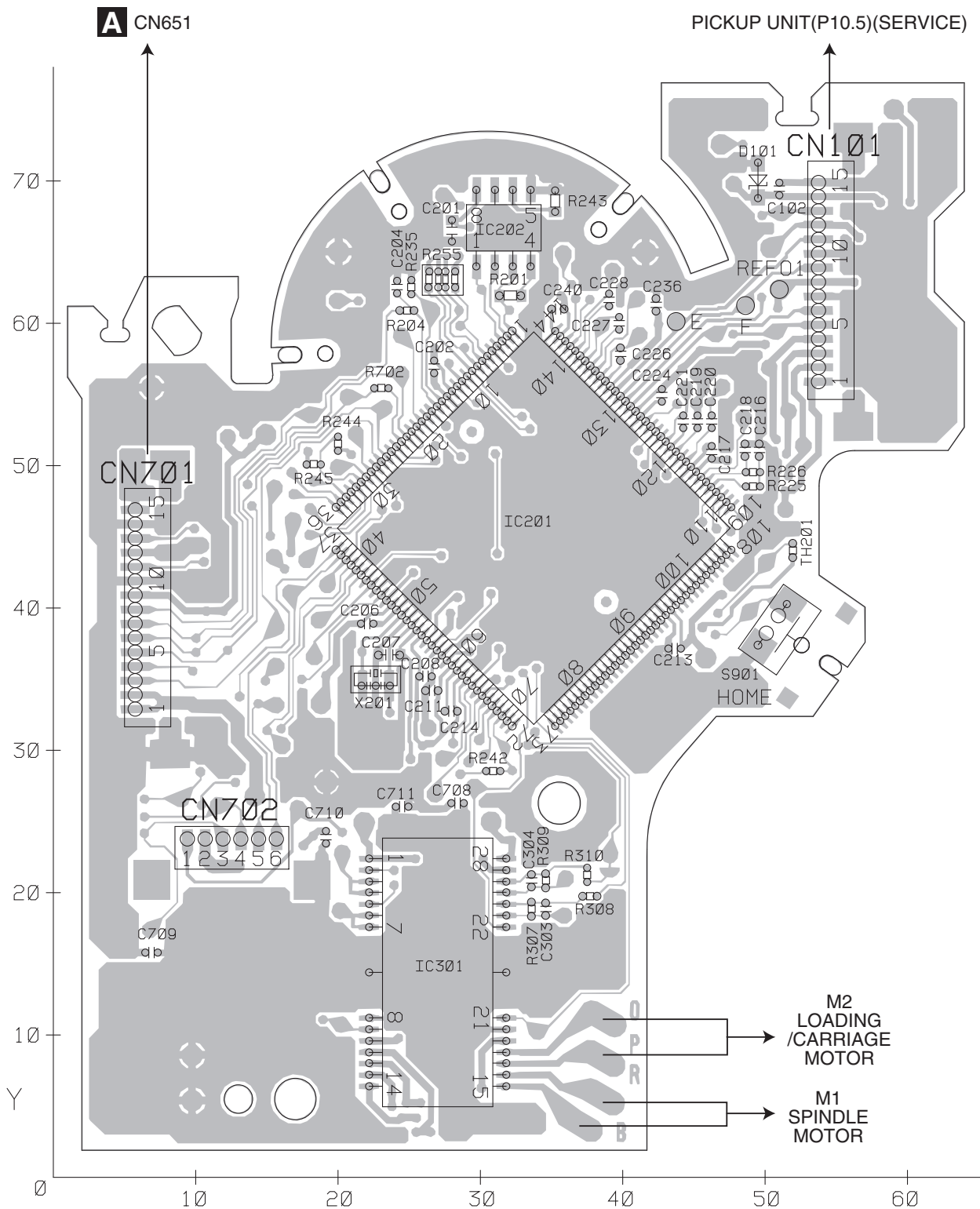
B

C

D

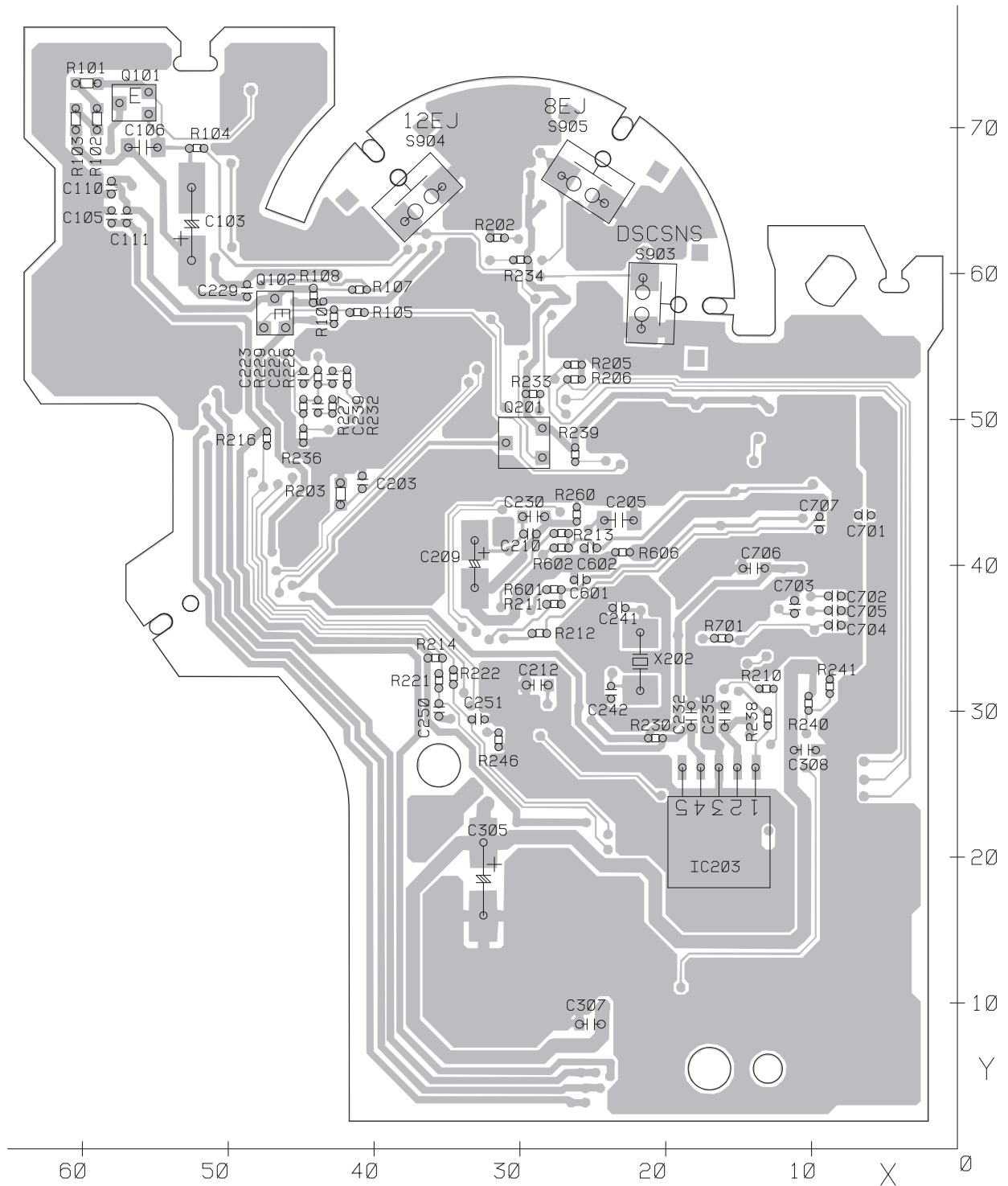
E

F



C

DEH-2050MP/XN/ES



12. ELECTRICAL PARTS LIST

NOTE:

- Parts whose parts numbers are omitted are subject to being not supplied.
- The part numbers shown below indicate chip components.

Chip Resistor

RS1/○○○○○J,RS1/○○○○○J

Chip Capacitor (except for CQS.....)

CKS....., CCS....., CSZS.....

- The \triangle mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- Meaning of the figures and others in the parentheses in the parts list.

Example) IC 301 is on the point (face A, 91 of x-axis, and 111 of y-axis) of the corresponding PC board.

IC 301 (A, 91, 111) IC NJM2068V

Circuit Symbol and No.

Part No.

Unit Number : YWM5234

Unit Name : Tuner Amp Unit

Unit Number : (2050MP/XN/ES)

Unit Name : Keyboard Unit

Unit Number : (2050MPG/XN/ES)

Unit Number : (2050MPG/XN/ES1)

Unit Name : Keyboard Unit

Unit Number : CWX3514

Unit Name : CD Core

Unit(S10.5COMP2)

A

Unit Number : YWM5234

Unit Name : Tuner Amp Unit

MISCELLANEOUS

IC 151	(B,124,101) IC	PML014A
IC 301	(A,95,133) IC	PAL007C
IC 601	(B,129,44) IC	PN5013B
IC 641	(B,161,30) IC	PDH131A
IC 911	(A,17,68) IC	BA4918-V12
Q 201	(B,130,130) Transistor	RT3T22M
Q 351	(B,162,127) Transistor	RT3N66M
Q 601	(A,152,67) Transistor	2SD1858
Q 821	(B,32,12) Transistor	2SA1036K
Q 822	(B,23,11) Transistor	RT1N141M-11
Q 931	(B,59,97) Transistor	2SC2412K

Q 991	(A,8,115) Transistor	2SD2396
Q 992	(B,14,106) Transistor	RT3T22M
D 301	(A,67,124) Diode	MPG06G-6415G3
D 302	(A,54,124) Diode	MPG06G-6415G3
D 832	(B,75,8) Diode	FTZ6R8E

D 901	(A,49,110) Diode	MPG06G-6415G3
D 902	(A,49,107) Diode	MPG06G-6415G3

Circuit Symbol and No.

Part No.

D 911	(A,52,80) Diode	MPG06G-6415G3
D 912	(A,45,80) Diode	MPG06G-6415G3
D 931	(A,65,109) Diode	HZS7L(A1)
D 991	(A,20,113) Diode	HZS7L(C3)
L 151	(A,138,106) Inductor	LAU2R2K
L 401	(A,150,82) Inductor	LAU2R2K
L 402	(A,146,98) Inductor	LAU2R2K
L 407	(B,166,66) Inductor	CTF1473
L 601	(B,119,22) Inductor	CTF1389
L 602	(A,152,25) Inductor	LAUR47K
L 603	(A,113,79) Inductor	LAU2R2K
L 604	(A,122,70) Inductor	LAUR47K
L 605	(A,128,69) Inductor	LAUR47K
L 606	(A,147,69) Inductor	LAU1R0K
L 607	(A,148,61) Inductor	LAU1R0K
L 608	(A,135,69) Inductor	LAU1R5K
L 609	(A,133,69) Inductor	LAU1R5K
L 610	(A,140,67) Inductor	LAU1R2J
L 611	(B,137,82) Inductor	CTF1379
L 612	(B,135,82) Inductor	CTF1379
L 613	(B,145,61) Inductor	CTF1379
L 614	(B,123,67) Inductor	CTF1379
L 615	(B,153,73) Inductor	CTF1379
L 616	(B,145,77) Inductor	CTF1379
L 617	(B,147,52) Inductor	CTF1389
L 801	(A,73,24) Inductor	LAU2R2K
L 901	(A,36,98) Choke Coil 600 μ H	CTH1280
X 601	(A,142,62) Oscillator 74.100 MHz	CSS1749
X 602	(A,115,58) Oscillator 4.7186 MHz	CSS1727
\triangle FU351	(B,135,132) Fuse 3 A	CEK1286
AR401	(B,164,111) Surge Protector	IMSA-6801-01Y901
	(A,165,75) FM/AM Tuner Unit	CWE2025

RESISTORS

R 151	(B,89,95)	RAB4C102J
R 156	(B,91,88)	RS1/16S681J
R 157	(B,94,88)	RS1/16S681J
R 162	(B,139,101)	RS1/16S102J
R 163	(B,106,106)	RS1/16S102J
R 201	(B,125,130)	RS1/16S103J
R 202	(B,132,134)	RS1/16S153J

Circuit Symbol and No.**Part No.**

C 606	(B,105,56)	CKSRYB103K50
C 607	(B,118,55)	CKSRYB103K50
C 608	(B,95,80)	CKSRYB103K50

A

C 609	(B,116,72)	CKSRYB331K50
C 610	(A,98,80)	CEJQ101M6R3
C 611	(B,116,70)	CKSRYB331K50
C 612	(B,120,58)	CKSRYB103K50
C 613	(A,104,58)	CEAL101M6R3

C 614	(B,168,88)	CKSRYB102K50
C 615	(B,125,62)	CKSRYB331K50
C 616	(B,125,69)	CKSRYB105K10
C 617	(B,130,61)	CKSRYB105K10
C 618	(B,113,54)	CCSRCH270J50

B

C 619	(B,144,71)	CKSRYB103K50
C 620	(B,144,57)	CKSRYB105K10
C 621	(B,152,70)	CKSRYB103K50
C 622	(B,142,54)	CKSRYB104K16
C 623	(B,134,66)	CKSRYB102K50

C 624	(B,131,66)	CKSRYB102K50
C 625	(B,137,72)	CCSRCH270J50
C 626	(B,131,72)	CCSRCH270J50
C 627	(B,136,79)	CCSRCH150J50
C 628	(B,143,64)	CKSRYB102K50

C

C 629	(B,136,60)	CCSRCH4R0C50
C 630	(B,144,69)	CCSRCH8R0D50
C 631	(B,108,72)	CKSRYB223K50
C 632	(B,130,23)	CKSRYB104K16
C 633	(B,147,31)	CKSRYB104K16

C 634	(B,113,58)	CCSRCH270J50
C 635	(B,147,55)	CKSRYB104K16
C 637	(B,110,77)	CKSRYB103K50
C 640	(B,125,60)	CKSRYB104K16
C 642	(B,109,103)	CKSRYB182K50

D

C 643	(B,133,99)	CKSRYB182K50
C 646	(B,116,22)	CKSRYB103K50
C 652	(B,49,31)	CKSRYB103K50
C 653	(B,114,33)	CCSRCH220J50
C 821	(B,36,10)	CKSRYB104K16

C 825	(B,61,8)	CCSRCH221J50
C 826	(B,82,14)	CCSRCH221J50
C 827	(B,71,8)	CCSRCH221J50
C 828	(B,69,8)	CCSRCH221J50
C 829	(B,63,8)	CCSRCH221J50

E

C 830	(B,65,8)	CKSRYB104K16
C 831	(B,67,8)	CCSRCH221J50
C 901	(A,52,114) 3 300 μ F/16 V	CCH1732
C 911	(A,59,62)	CEJQ100M16
C 912	(A,48,66)	CEAT102M16

C 913	(B,28,71)	CKSRYB104K16
C 914	(A,52,62)	CEAT221M10
C 915	(A,46,55)	CEJQ100M16
C 916	(A,58,55) 1 000 μ F/6.3 V	CCH1751(P35)
C 917	(B,28,77)	CKSRYB104K16

C 991	(B,11,108)	CKSRYB473K25
C 992	(A,12,97)	CEJQ101M10

F

B**Unit Number : (2050MP/XN/ES)****Unit Name : Keyboard Unit****Circuit Symbol and No.****Part No.****MISCELLANEOUS**

IC 1801	(B,26,121) IC	PD6340A
IC 1802	(A,10,161) Remote IC	GP1UX51RK
D 1803	(A,14,42) LED	CL-195SR-CD
D 1805	(A,15,23) LED	CL-195SR-CD
D 1806	(A,12,11) LED	CL-195SR-CD
D 1807	(A,41,42) LED	CL-195SR-CD
D 1808	(A,28,28) LED	CL-195SR-CD
D 1809	(A,35,20) LED	CL-195SR-CD
D 1810	(A,22,7) LED	CL-195SR-CD
D 1811	(A,36,63) LED	CL-195SR-CD
D 1812	(A,41,84) LED	CL-195SR-CD
D 1813	(A,41,97) LED	CL-195SR-CD
D 1814	(A,41,111) LED	CL-195SR-CD
D 1815	(A,40,124) LED	CL-195SR-CD
D 1816	(A,39,138) LED	CL-195SR-CD
D 1817	(A,38,151) LED	CL-195SR-CD
D 1818	(A,6,149) LED	CL-195SR-CD
D 1819	(A,28,55) LED	CL-195SR-CD
D 1821	(A,15,61) LED	CL-195SR-CD
D 1822	(A,24,74) White LED	NESW505C-5273
D 1826	(B,26,151) Diode	MALS068X
D 1827	(B,31,148) Diode	MALS068X
D 1828	(B,28,151) Diode	MALS068X
X 1801	(B,31,106) Ceramic Resonator 5.00 MHz	CSS1731
S 1833	(A,28,42) Rotary Switch	YSD5018

LCD1801	(A,15,149) LCD	CAW1930
---------	----------------	---------

RESISTORS

R 1801	(B,29,89)	RS1/16S222J
R 1802	(B,27,93)	RS1/16S222J
R 1803	(B,19,68)	RS1/4SA821J
R 1804	(B,24,68)	RS1/4SA821J
R 1805	(B,36,96)	RS1/4SA821J
R 1806	(B,36,100)	RS1/4SA681J
R 1807	(B,22,68)	RS1/4SA681J
R 1809	(B,27,50)	RS1/16S473J
R 1810	(B,26,75)	RS1/4SA821J
R 1833	(B,23,145)	RS1/16S2R2J
R 1835	(B,23,150)	RS1/16S101J
R 1836	(B,18,154)	RS1/16S103J
R 1837	(B,31,146)	RS1/16S101J
R 1838	(B,25,150)	RS1/16S101J

CAPACITORS

C 1801	(B,28,133)	CKSRYB105K10
C 1803	(B,18,152)	CKSYF106Z10
C 1810	(B,23,152)	CKSRYB472K50
C 1811	(B,30,152)	CKSRYB472K50

B**Unit Number : (2050MPG/XN/ES)****Unit Number : (2050MPG/XN/ES1)****Unit Name : Keyboard Unit****MISCELLANEOUS**

IC 1801	(B,26,121) IC	PD6340A
---------	---------------	---------

5			6			7			8		
Circuit Symbol and No.			Part No.			Circuit Symbol and No.			Part No.		
IC 1802	(A,10,161)	Remote IC	GP1UX51RK			X 201	(A,23,35)	Ceramic Resonator 16.934 MHz	CSS1603		
D 1803	(A,14,42)	LED	CL-195PG-CD			S 901	(A,53,37)	Switch(HOME)	CSN1067		
D 1805	(A,15,23)	LED	CL-195PG-CD			S 903	(B,19,58)	Switch(DSCSNS)	CSN1067		A
D 1806	(A,12,11)	LED	CL-195PG-CD			S 904	(B,38,67)	Switch(12EJ)	CSN1068		
						S 905	(B,24,68)	Switch(8EJ)	CSN1068		
D 1807	(A,41,42)	LED	CL-195PG-CD			RESISTORS					
D 1808	(A,28,28)	LED	CL-195PG-CD			R 101	(B,60,73)		RS1/10SR2R4J		
D 1809	(A,35,20)	LED	CL-195PG-CD			R 102	(B,59,71)		RS1/10SR2R4J		
D 1810	(A,22,7)	LED	CL-195PG-CD			R 103	(B,60,71)		RS1/10SR2R7J		
D 1811	(A,36,63)	LED	CL-195PG-CD			R 104	(B,52,69)		RS1/16SS222J		
						R 105	(B,41,57)		RS1/16SS102J		
D 1812	(A,41,84)	LED	CL-195PG-CD			R 107	(B,41,59)		RS1/16SS105J		
D 1813	(A,41,97)	LED	CL-195PG-CD			R 202	(B,32,62)		RS1/16SS473J		B
D 1814	(A,41,111)	LED	CL-195PG-CD			R 203	(B,42,45)		RS1/16S473J		
D 1815	(A,40,124)	LED	CL-195PG-CD			R 204	(A,25,61)		RS1/16SS221J		
D 1816	(A,39,138)	LED	CL-195PG-CD			R 206	(B,26,53)		RS1/16SS104J		
D 1817	(A,38,151)	LED	CL-195PG-CD			R 210	(B,13,32)		RS1/16SS102J		
D 1818	(A,6,149)	LED	CL-195PG-CD			R 214	(B,36,34)		RS1/16SS472J		
D 1819	(A,28,55)	LED	CL-195PG-CD			R 216	(B,47,49)		RS1/16SS472J		
D 1821	(A,15,61)	LED	CL-195PG-CD			R 221	(B,36,32)		RS1/16SS103J		
D 1822	(A,24,74)	White LED	NESW505C-5273			R 222	(B,35,32)		RS1/16SS103J		
D 1826	(B,26,151)	Diode	MALS068X			R 225	(A,49,49)		RS1/16SS393J		
D 1827	(B,31,148)	Diode	MALS068X			R 226	(A,49,50)		RS1/16SS562J		
D 1828	(B,28,151)	Diode	MALS068X			R 227	(B,45,51)		RS1/16SS122J		C
X 1801	(B,31,106)	Ceramic Resonator 5.00 MHz	CSS1731			R 228	(B,42,53)		RS1/16SS472J		
S 1833	(A,28,42)	Rotary Switch	YSD5020			R 230	(B,21,28)		RS1/16SS0R0J		
LCD1801	(A,15,149)	LCD	CAW1930			R 232	(B,43,51)		RS1/16SS122J		
RESISTORS						R 233	(B,29,52)		RS1/16SS103J		
R 1801	(B,29,89)		RS1/16S222J			R 234	(B,30,61)		RS1/16SS473J		
R 1802	(B,27,93)		RS1/16S222J			R 235	(A,25,63)		RS1/16SS473J		
R 1803	(B,19,68)		RS1/4SA681J			R 239	(B,26,48)		RS1/16SS473J		
R 1804	(B,24,68)		RS1/4SA681J			R 240	(B,10,31)		RS1/16SS473J		
R 1805	(B,36,96)		RS1/4SA681J			R 241	(B,9,32)		RS1/16SS103J		
R 1806	(B,36,100)		RS1/4SA471J			R 244	(A,20,52)		RS1/16SS473J		D
R 1807	(B,22,68)		RS1/4SA471J			R 255	(A,27,63)		RAB4CQ104J		
R 1809	(B,27,50)		RS1/16S473J			R 307	(A,34,19)		RS1/16SS183J		
R 1810	(B,26,75)		RS1/4SA821J			R 308	(A,38,20)		RS1/16SS183J		
R 1833	(B,23,145)		RS1/16S2R2J			R 309	(A,35,21)		RS1/16SS183J		
R 1835	(B,23,150)		RS1/16S101J			R 310	(A,38,21)		RS1/16SS183J		
R 1836	(B,18,154)		RS1/16S103J			R 601	(B,28,38)		RS1/16SS0R0J		
R 1837	(B,31,146)		RS1/16S101J			R 602	(B,27,41)		RS1/16SS0R0J		
R 1838	(B,25,150)		RS1/16S101J			R 606	(B,23,41)		RS1/16SS0R0J		
CAPACITORS						R 701	(B,16,35)		RS1/16SS221J		
C 1801	(B,28,133)		CKSRYB105K10			R 702	(A,23,55)		RS1/16SS221J		E
C 1803	(B,18,152)		CKSYF106Z10			CAPACITORS					
C 1810	(B,23,152)		CKSRYB472K50			C 106	(B,56,69)		CKSQYB475K6R3		
C 1811	(B,30,152)		CKSRYB472K50			C 202	(A,27,57)		CKSSYB104K10		
C						C 204	(A,24,63)		CKSSYB103K16		
Unit Number : CWX3514						C 205	(B,23,43)		CKSQYB475K6R3		
Unit Name : CD Core						C 206	(A,22,39)		CKSSYB104K10		
Unit(S10.5COMP2)						C 207	(A,24,37)		CKSRYB104K16		
MISCELLANEOUS						C 209	(B,33,40)		CEVW220M6R3		
IC 201	(A,34,46)	IC	PE5547A			C 210	(B,29,42)		CKSSYB104K10		
IC 301	(A,27,14)	IC	BA5839FP			C 211	(A,27,34)		CKSSYB104K10		F
Q 101	(B,56,72)	Transistor	2SA1577			C 212	(B,29,32)		CKSRYB104K16		
Q 102	(B,47,57)	Chip Transistor	2SB1689			C 213	(A,44,37)		CKSSYB104K10		

Circuit Symbol and No.

Part No.

A

C 214	(A,28,33)	CKSSYB104K10
C 216	(A,50,51)	CKSSYB332K50
C 217	(A,46,51)	CKSSYB104K10
C 218	(A,49,51)	CKSSYB473K10
C 219	(A,45,53)	CKSSYB104K10
C 220	(A,46,53)	CKSSYB182K50
C 221	(A,44,53)	CKSSYB104K10
C 222	(B,43,53)	CCSSCH560J50

B

C 223	(B,45,53)	CCSSCH4R0C50
C 224	(A,43,55)	CKSSYB104K10
C 226	(A,40,58)	CCSSCH680J50
C 227	(A,40,60)	CCSSCH470J50
C 228	(A,39,62)	CKSSYB103K16
C 229	(B,49,59)	CKSSYB104K10
C 236	(A,42,61)	CKSSYB104K10
C 239	(B,44,51)	CCSSCH220J50
C 240	(A,35,61)	CKSSYB104K10
C 250	(B,36,30)	CKSSYB102K50

C

C 251	(B,33,29)	CKSSYB102K50
C 303	(A,35,19)	CKSSYB472K25
C 304	(A,34,21)	CKSSYB223K16
C 307	(B,25,9)	CKSRYB104K16
C 308	(B,10,27)	CKSRYB105K10
C 703	(B,11,37)	CCSSCH101J50
C 704	(B,8,36)	CKSSYB102K50
C 711	(A,25,26)	CKSSYB104K10

Miscellaneous Parts List

M

M 1	Pickup Unit(P10.5)(Service)	CXX1942
M 2	Motor Unit(SPINDLE)	CXC7134
M 2	Motor Unit(LOADING/CARRIAGE)	CXC4026

D

E

F

Service Manual

ORDER NO.
CRT3815

CD MECHANISM MODULE(S10.5COMP2)

CX-3195

This service manual describes the operation of the CD mechanism module incorporated in models listed in the table below.

When performing repairs use this manual together with the specific manual for model under repair.

Model	Service Manual	CD Mechanism Module
DEH-2900MP/XN/EW5 DEH-2920MP/XN/EW5 DEH-2900MPB/XN/EW5 DEH-2910MP/XN/UR	CRT3802	CXK5760
DEH-2950MP/XN/ES DEH-2950MP/XN/ES1 DEH-2990MP/XN/ID	CRT3820	CXK5760
DEH-P390MP/XU/UC DEH-P3900MP/XU/UC	CRT3816	CXK5760
DEH-P4950MP/XU/ES DEH-P4950MP/XU/CN5	CRT3817	CXK5760
DEH-P2900MP/XU/UC	CRT3823	CXK5760
DEH-P3950MP/XU/ES DEH-P3950MP/XU/CN5	CRT3824	CXK5760
DEH-P5900MP/XU/EW5	CRT3828	CXK5760

Model	Service Manual	CD Mechanism Module
DEH-3900MP/XN/EW5 DEH-3990MP/XN/ID DEH-P40MP/XU/EW5 DEH-P4950MP/XU/ES	CRT3804 CRT3829 CRT3834 CRT3835	CXK5760 CXK5760 CXK5760 CXK5760
DEH-P490IB/XN/UC DEH-P4900IB/XN/UC	CRT3846	CXK5760
DEH-P4900IB/XN/EW5	CRT3847	CXK5760
DEH-P5950IB/XN/ES DEH-P5950IB/XN/ES1 DEH-P5990IB/XN/ID	CRT3848	CXK5760
DEH-P590IB/XN/UC DEH-P5900IB/XN/UC	CRT3851	CXK5760
DEH-P6900IB/XN/EW5 DEH-P6950IB/XN/ES DEH-P6950IB/XN/ES1	CRT3852 CRT3853	CXK5760 CXK5760

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1. CIRCUIT DESCRIPTIONS

The recent mainstay of the CD LSI is the LSI integrating the core DSP with DAC or RF amplifier, which are generally employed as peripheral circuits, however, PE5547A, used in this product, is an LSI integrating the afore-mentioned LSI unit and microcomputer unit in one chip.

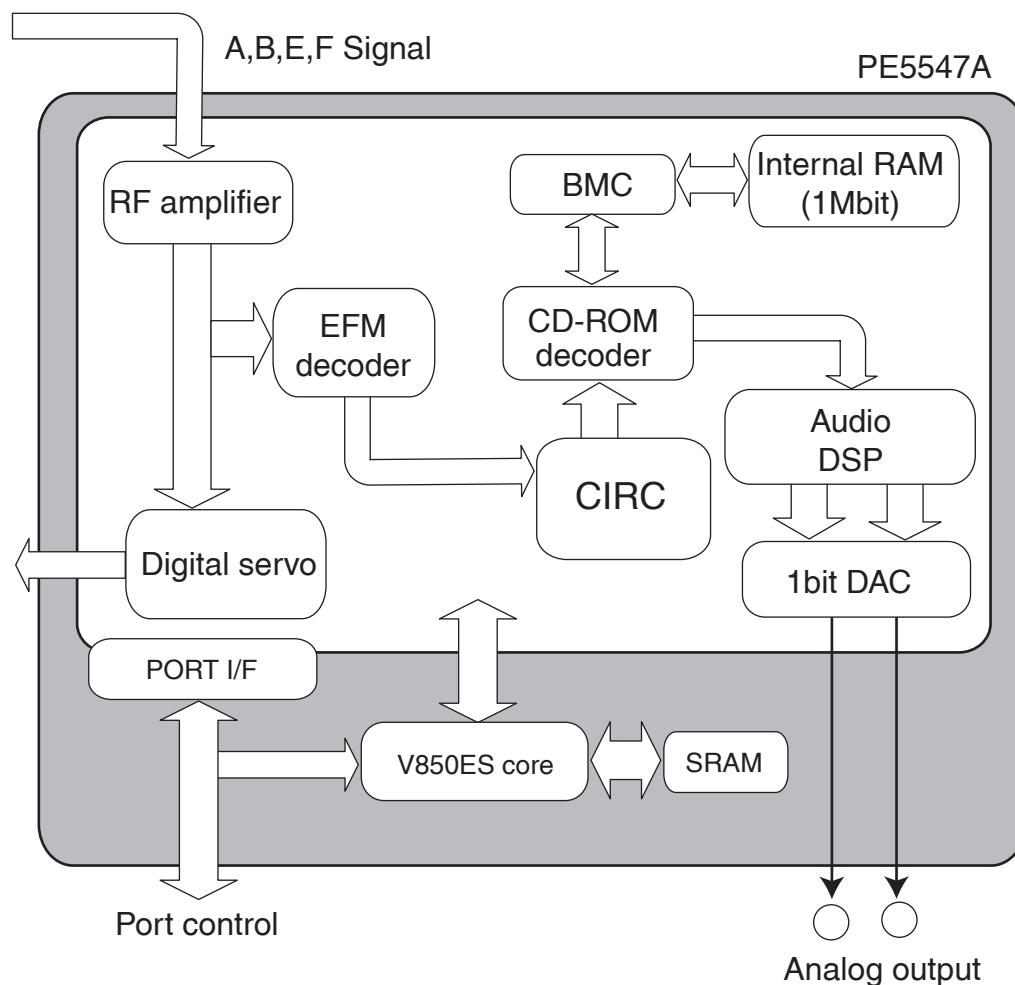


Fig.1.0.1 Block diagram of CD LSI PE5547A

1.1 PREAMPLIFIER BLOCK

In the preamplifier block, the pickup output signals are processed to generate signals that are used in the subsequent blocks: servo, demodulator, and control blocks. Signals from the pickup are I/V converted in the pickup with the preamplifier with built-in photo detectors, and after added with the RF amplifier, they are used to produce such signals as RF, FE, TE, and TE zero-cross signals. The preamplifier block is built in CD LSI PE5547A (IC201), whose parts are described individually below. Incidentally, as this LSI employs a single power supply (+ 3.3 V) specification, the reference voltages of this LSI and the pickup are the REFO (1.65 V) for both. The REFO is an output obtained from REFOUT in the LSI via the buffer amplifier, and is output from the pin 133 of this LSI. All measurements will be performed with this REFO as the reference.

Caution: Be careful not to short-circuit the REFO and GND when measuring.

1.1.1 APC (Automatic Power Control) circuit

Since laser diodes have extremely negative temperature characteristics in optical output when driven in constant current, it is necessary to control the current with the monitor diodes in order to keep the output constant. This is the feature of the APC circuit. The LD current is obtained by measuring the voltage between LD1 and V3R3, and divide the value by 7.5 (ohms), which becomes about 30 mA. The voltage between LD1 and V3R3 is set to about 225 mV.

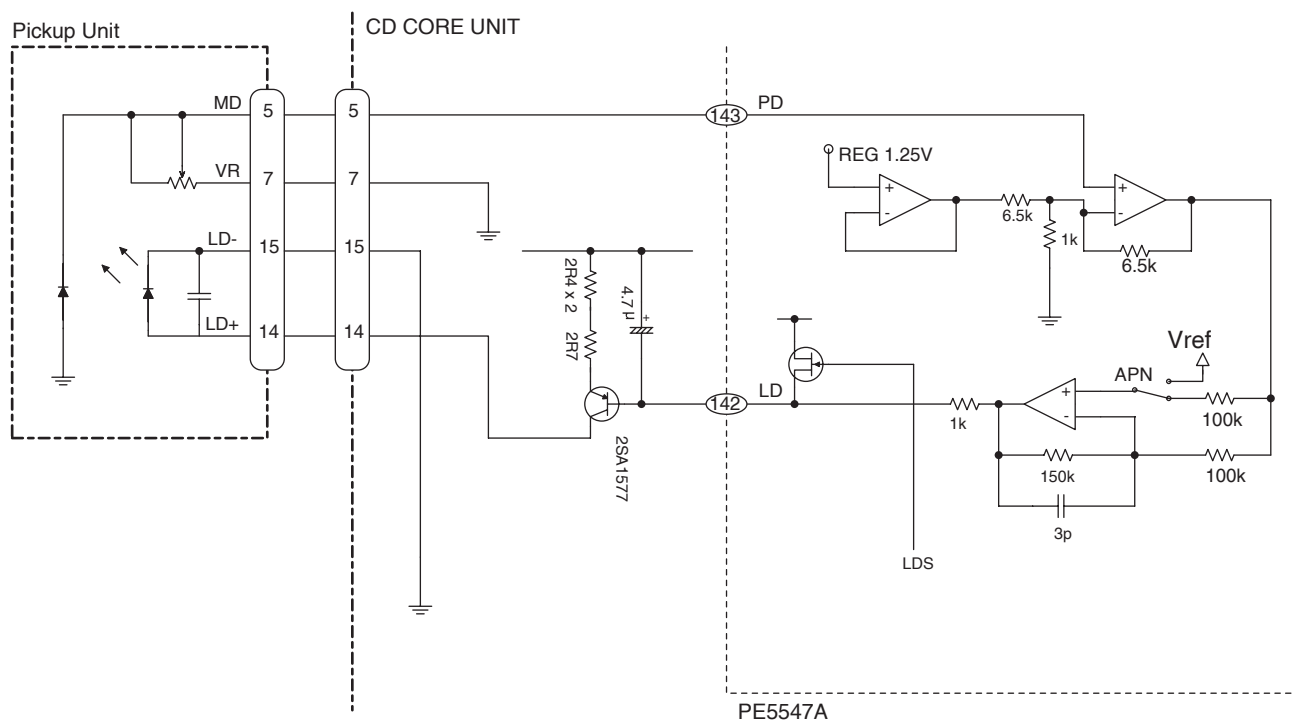


Fig.1.1.1 APC

1.1.2 RF and RFAGC amplifiers

The output from the photo-detector (A + C) and (B + D) is provided from the RFO terminal as the RF signal (which can be used for eye-pattern check), after it is added, amplified, and equalized inside this LSI. The low frequency component of the voltage RFO is calculated as below.

$$RFO = (A + B + C + D) \times 2$$

The RFO is used for the FOK generation circuit and RF offset adjustment circuit.

The RFO signal, output from the pin 122, is A/C-coupled externally, input to the pin 121, and amplified in the RFAGC amplifier to obtain the RFAGC signal.

Also, this LSI is equipped with the RFAGC auto-adjustment function, explained below, which switches feedback gains of the RFAGC amplifier so that the RFO output will be 1.5 V.

This RFO signal is also used for the EFM, DFCT, MIRR, and RFAGC auto-adjustment circuits.

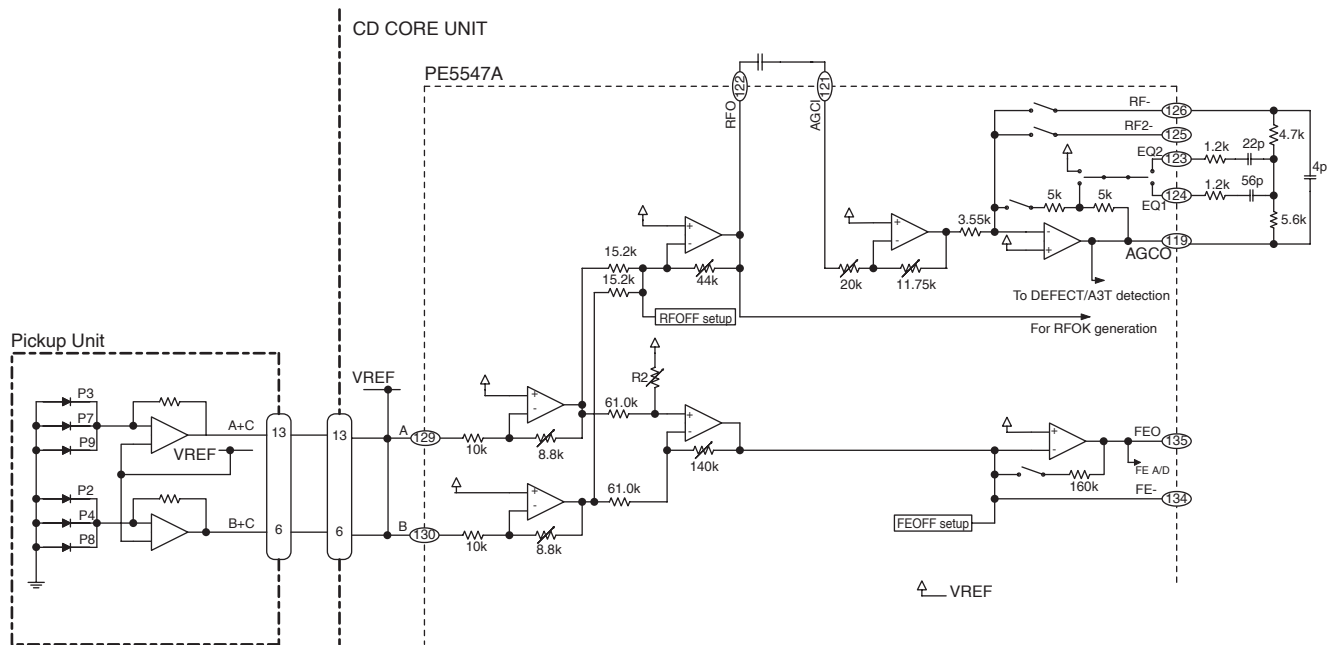


Fig.1.1.2 RF/AGC/FE

1.1.3 Focus error amplifier

The photo-detector outputs (A + C) and (B + D) are passed through the differential amplifier and the error amplifier, and (A + C - B - D) is provided from the pin 135 as the FE signal. The low frequency component of the voltage FE is calculated as below.

$$\begin{aligned} FE &= (A + C - B - D) \times 8.8k / 10k \times 111k / 61k \times 160k / 72k \\ &= (A + C - B - D) \times 3.5 \end{aligned}$$

For the FE outputs, an S-shaped curve of 1.5 Vp-p is obtained with the REFO as the reference. The cutoff frequency for the subsequent stage amplifiers is 14.6 kHz.

1.1.4 RFOK circuit

This circuit generates the RFOK signal, which indicates the timing to close the focus loop and focus-close status during the play mode, from the pin 70. As for the signal, "H" is output in closing the focus loop and during the play mode.

Additionally, the RFOK becomes "H" even in a non-pit area, since the DC level of the RFO signal is peak-held in the subsequent digital block and compared at a certain threshold level to generate the RFOK signal. Therefore, the focus is closed even on a mirror-surface area of a disc. This signal is also supplied to the microcomputer via the low-pass filter as the FOK signal, which is used for protection and gain switching of the RF amplifier.

1.1.5 Tracking error amplifier

The photo-detector outputs E and F are passed through the differential amplifier and the error amplifier to obtain (E - F), and then provided from the pin 138 as the TE signal. The low frequency component of the voltage TE is calculated as below.

$$\begin{aligned} TEO &= (E - F) \times 63k / 112k \times 160k / 160k \times 181k / 45.4k \times 160k / 80k \\ &= (E - F) \times 4.48 \end{aligned}$$

For the TE output, TE waveform of about 1.3 Vp-p with the REFO as the reference. The cutoff frequency in the subsequent is 21.1 kHz.

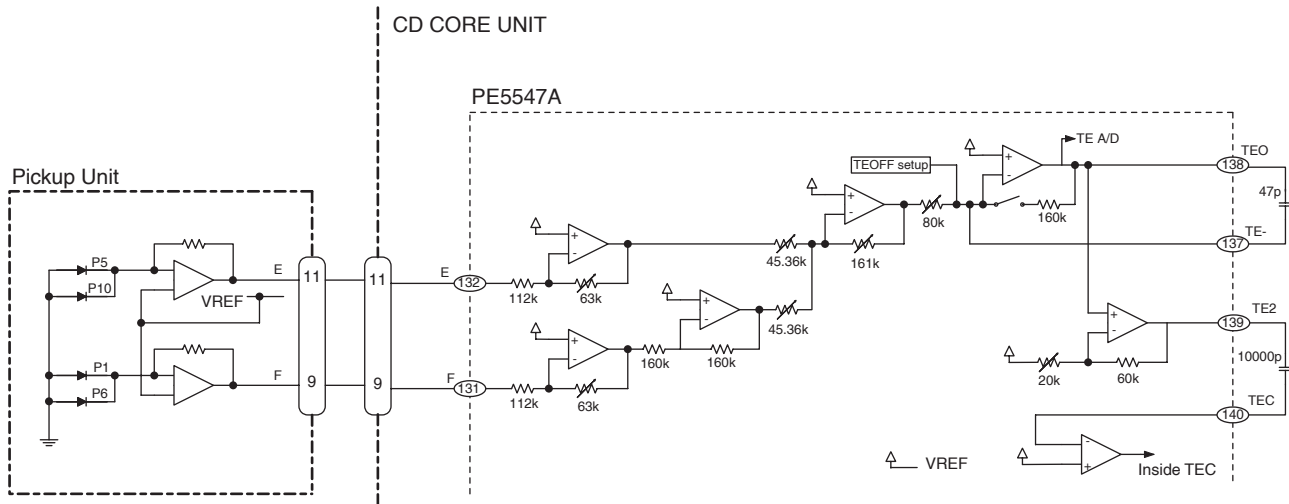


Fig.1.1.3 TE

1.1.6 Tracking zero-cross amplifier

The tracking zero-cross signal (hereinafter referred to as TEC signal) is obtained by amplifying the TE signal by fourfold, and used to detect the tracking-error zero-cross point. As the purpose of detecting the zero-cross point, the following two points can be named:

1. To use for track-counting in the carriage move and track jump modes
2. To use for detecting the direction in which the lens moves in tracking close. (Used in the tracking brake circuit to be explained later.)

The frequency range of the TEC signal is from 300 Hz to 20 kHz, and

TEC voltage = TE level x 4

The TEC level can be calculated at 4.62 V, which, at this level, exceeds the D range of the operational amplifier, and clips the signal, but, because the CD LSI only uses the signal at the zero-cross point, it poses no particular problem.

1.1.7 EFM circuit

The EFM circuit converts the RF signal into digital signals of 0 and 1. The AGCO signal output from the pin 119 is A/C-coupled externally, input to the pin 118, and supplied to the EFM circuit.

Missing RF signal due to scratches and stains on the disc, and asymmetry of the upper and lower parts of the RF, caused by variation in disc production, cannot be entirely eliminated in AC coupling process, the reference voltage ASY of the EFM comparator is controlled, using the probability that 0 and 1 occur at 50%. Thus, the comparator level will always stay around the center of the RFO signal. This reference voltage ASY is generated by passing the EFM comparator output through the low-pass filter. The EFM signal is output from the pin 113.

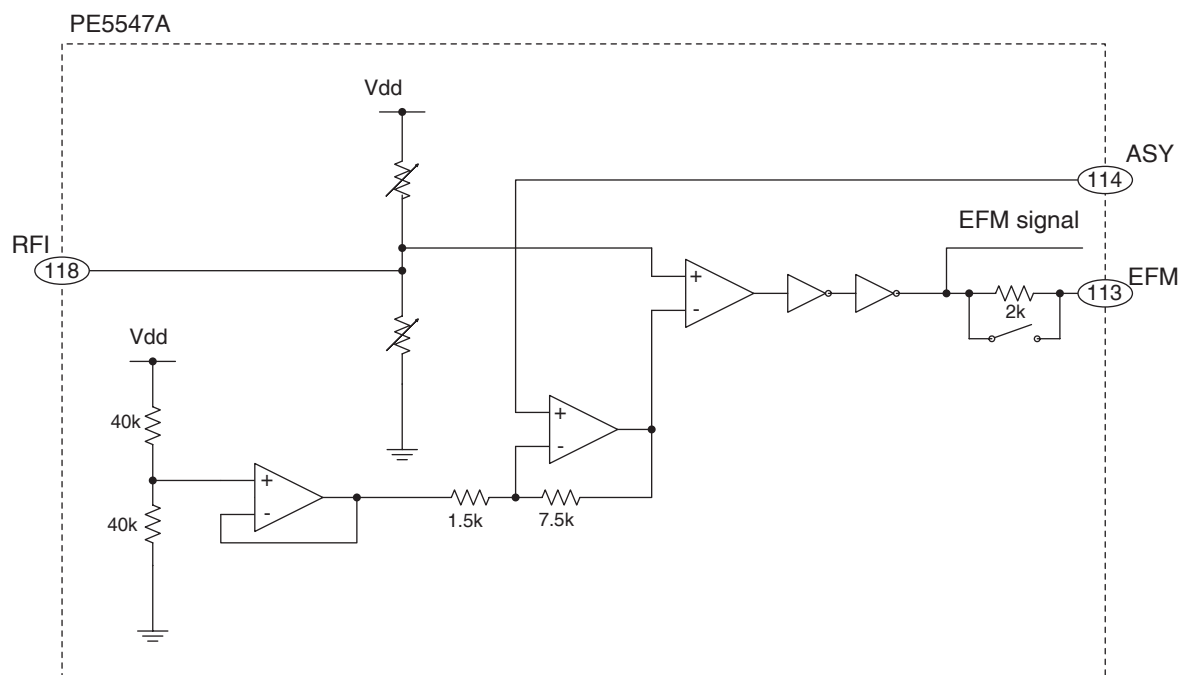


Fig.1.1.4 EFM

1.2 SERVO BLOCK (PE5547A: IC201)

The servo block performs servo control such as error signal equalizing, in-focus, track jump and carriage move. The DSP block is the signal-processing unit, where data decoding, error correction, and compensation are performed. The FE and TE signals, generated in the preamplifier stage, are A/D-converted, and output drive signals for the focus, tracking, and carriage systems via the servo block. Also, the EFM signal is decoded in the signal-processing unit, and ends up in outputting D/A-converted audio signals through the D/A converter. Furthermore, in this decoding process, the spindle servo error signal is generated, supplied to the spindle servo block, and used to output the spindle drive signal.

Each drive signal for focus, tracking, carriage, and spindle servos (FD, TD, SD, and MD) are output as PWM3 data, and then converted to analog data through the LPF. These drive signals, after changed to analog form, can be monitored with the FIN, TIN, CIN, and SIN signals, respectively. Subsequently, the signals are amplified and supplied to the actuator and motor for each signal.

1.2.1 Focus servo system

The main equalizer of the focus servo consists of the digital equalizer block. The figure 1.2.1 shows the block diagram of the focus servo system.

In the focus servo system, it is necessary to move the lens within the in-focus range in order to close the focus loop. For that purpose, the in-focus point is looked for by moving the lens up and down with the focus search voltage of triangular signal. During this time, the rotation of the spindle motor is retained at a certain set speed by kicking the spindle motor.

The servo LSI monitors the FE and RFOK signals and automatically performs the focus-close operations at an appropriate timing. The focus-close operation is performed when the following three conditions are satisfied at the same time:

- 1) The lens moves toward the disc surface.
- 2) RFOK = "H"
- 3) The FE signal is zero-crossed.

Consequently, the FE converges to "0" (= REFO).

When the above-mentioned conditions are met and the focus loop is closed, the FSS bit is shifted from "H" to "L," and then, in 10 ms, the CPU of the LSI starts monitoring the RFOK signal obtained through the low-pass filter.

If the RFOK signal is determined to be "L," the CPU of the LSI takes several actions including protection.

Fig.1.2.2 shows a series of actions concerning the focus close operations. (It shows a case where the focus loop cannot be closed.)

With the focus mode selector displaying 01 in the test mode, pressing the focus close button, allows to check the S-shaped curve, search voltage, and actual lens behavior.

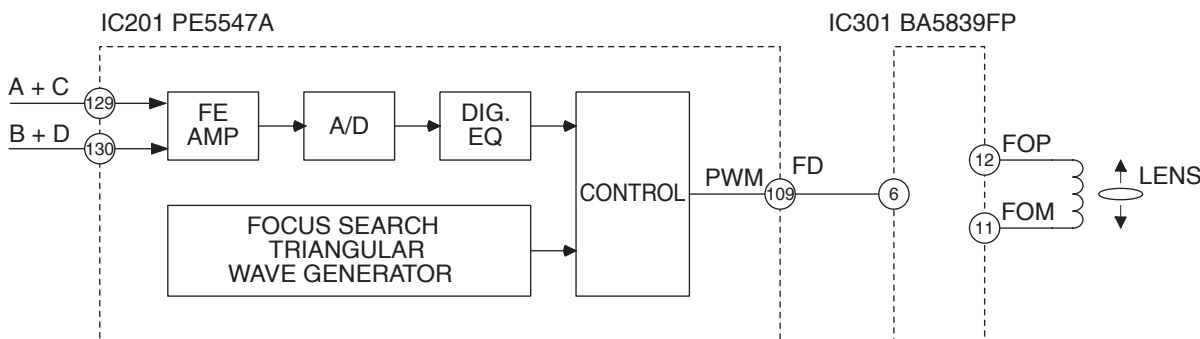


Fig.1.2.1 Block diagram of the focus servo system

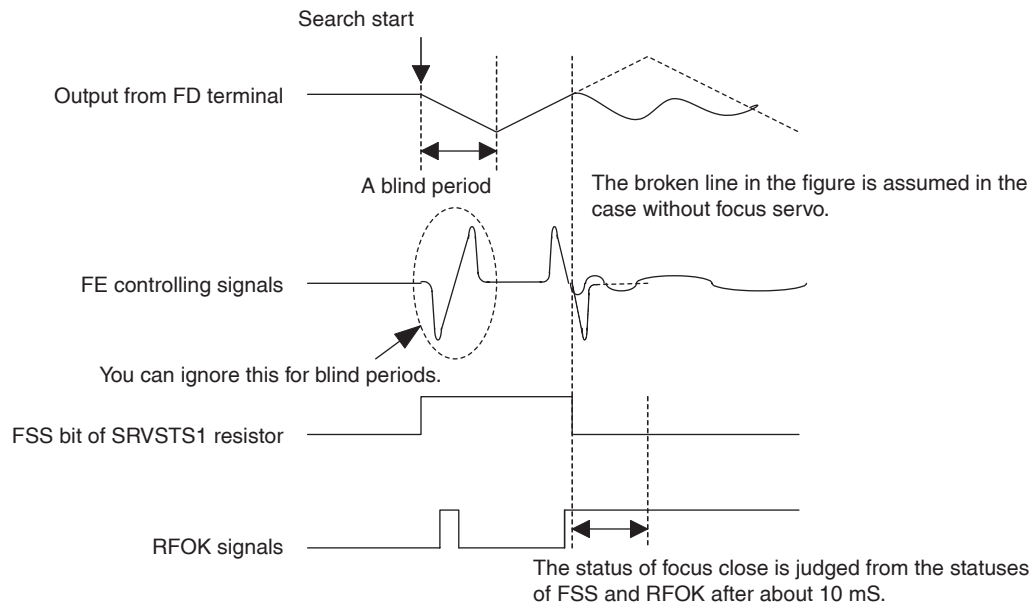


Fig.1.2.2 Timing chart for focus close operations

1.2.2 Tracking servo system

The main equalizer of the tracking servo consists of the digital equalizer block. The figure 1.2.3 shows the block diagram of the tracking servo system.

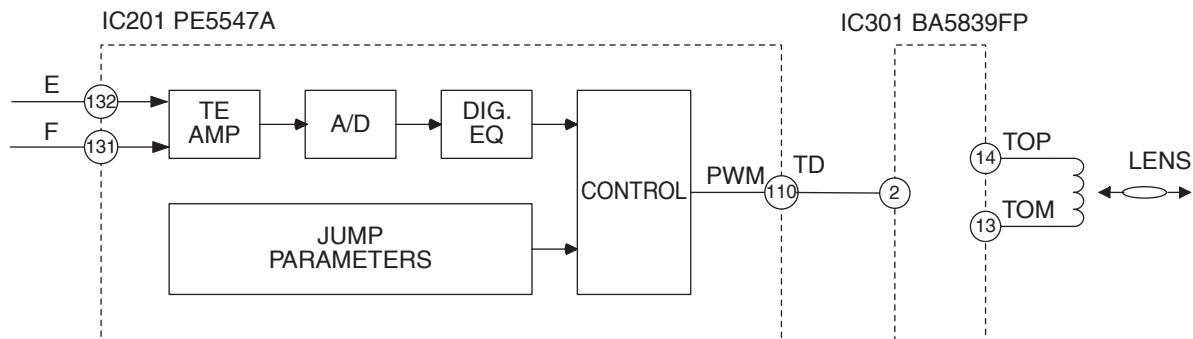


Fig.1.2.3 Block diagram of the tracking servo system

(a) The track jump operation is automatically performed by the auto-sequence function inside the LSI with a command from the CPU of the LSI. For the track jumps used in the search mode, a single track jump and four to 100 multi-track jump are available in this system. In the test mode, out of these track jumps, 1, 32, and 32 * 3 track jumps, as well as carriage move can be performed and checked in mode selection. In a track jump, the CPU of the LSI sets about half the number of the total tracks to jump (about five tracks for a 10-track jump), and the set number of tracks are counted using the TEC signal. By outputting the brake pulse for a certain period of time (set by the CPU of the LSI) from the time the set number is counted, and stopping the lens, the tracking loop can be closed so that the normal play can be continued.

Also, in order to facilitate closing of the tracking loop in a track jump, the brake circuit is kept ON for 50 msec, after the brake pulse is stopped, for increasing the tracking servo gain. The FF/REW action in the normal operation mode is realized by performing single jumps consecutively. The speed is approximately 10 times faster than in the normal mode.

(b) Brake circuit

Since the servo loop is not closed very well in the setup mode and track jump mode, the brake circuit is used for stabilizing the servo-loop close operation. The brake circuit detects the direction in which the lens moves, and outputs only the drive signal for the direction opposite to the movement to slow down the lens, thereby stabilizing the tracking servo-loop close operation. Additionally, the off-track direction is determined from the TEC and MIRR signals, as well as their phase relation.

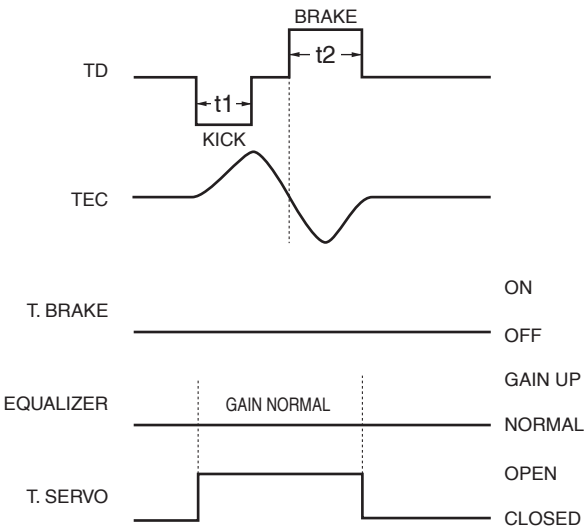


Fig.1.2.4 Single-track jump

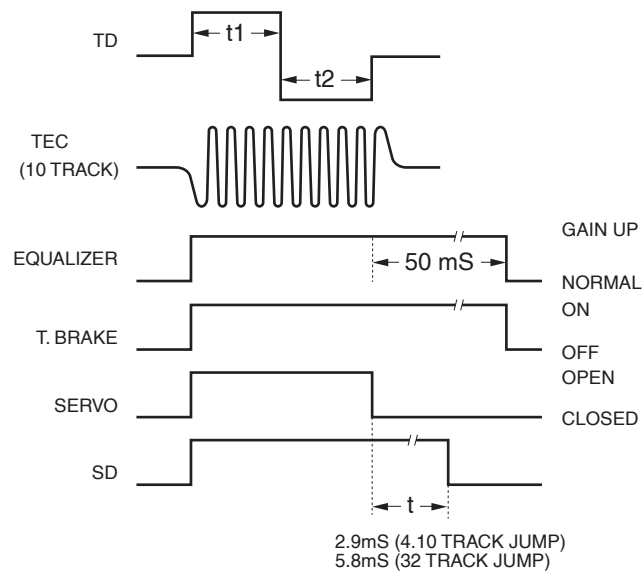
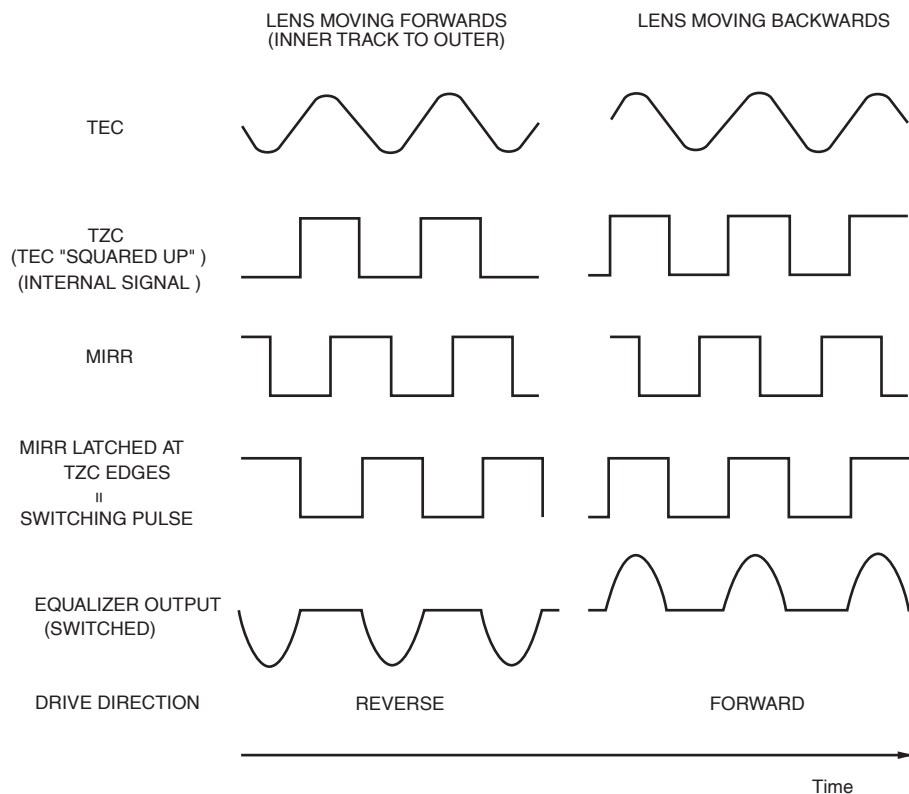


Fig.1.2.5 Multi-track jump



Note : Equalizer output assumed to have same phase as TEC.

Fig.1.2.6 Track brake

1.2.3 Carriage servo system

The carriage servo system inputs the output of the low frequency component from the tracking equalizer (information on the lens position) to the carriage equalizer, and, after the gain is increased to a certain level, outputs the drive signal from the CD of the LSI. This signal is applied to the carriage motor via the driver IC.

Specifically, since it is necessary to move the whole pickup to the FORWARD direction when the lens offset reaches a certain level during the play mode, the equalizer gain is set to output higher voltage than the carriage motor starting voltage at this time. In actual operations, a certain threshold level is preset in the servo LSI for the equalizer output, and only when it exceeds the threshold level, the drive voltage will be output. This can reduce the power consumption. Also, before the whole pickup starts moving, the equalizer output voltage may exceed the threshold level a few times, due to such causes as eccentricity of discs. In this case, the output waveform of the drive voltage from the LSI assumes a pulse-like form.

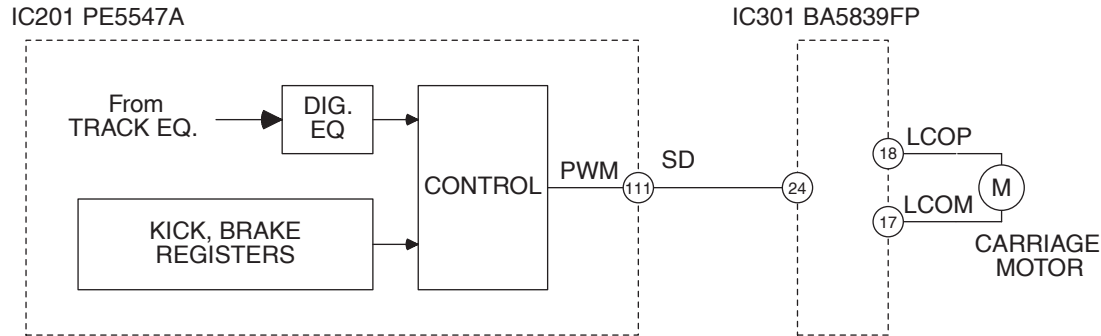


Fig.1.2.7 Block diagram for the carriage servo block

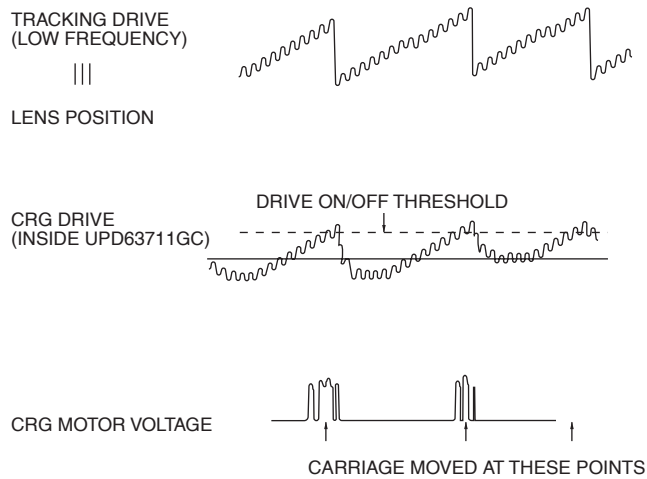


Fig.1.2.8 Waveforms of the carriage signal

1.2.4 Spindle servo system

In the spindle servo system, the following modes are available:

1) Kick

Used to accelerate the disc rotation in the setup mode.

2) Offset

a. Used in the setup mode after the kick mode, until the TBAL adjustment is completed.

b. Used during the play mode when the focus loop is unlocked, until it is locked again.

In both cases, the mode is used to keep the disc rotation approximately normal.

3) Applicable servo

CLV servo mode, used in the normal operation.

In the EFM demodulation block, by WFCK/16 sampling whether the frame sync signal and the internal frame counter output are synchronized, a signal is created to show if they are "in-sync" or "non-sync." The status is not recognized as asynchronous until the signal is "non-sync" for eight consecutive times; otherwise it is recognized as synchronous. In the applicable servo mode, the leading-in servo mode is automatically selected in the asynchronous status, and the normal servo mode in the synchronous status.

4) Brake

Used to stop the spindle motor.

In accordance with the CPU of the LSI command, the brake voltage is sent out from the servo LSI. At this time, the EFM waveform is monitored in the LSI, and when the longest EFM pattern exceeds a certain interval (or the rotation slows down enough), a flag is set inside the CD of the LSI, and the CPU of the LSI switches off the brake voltage. If a flag is not set within a certain period, the CPU of the LSI shifts the mode from the brake mode to the stop mode, and retains the mode for a certain period of time. If the mode switches to this stop mode in the eject operation, the disc will be ejected after the period of time mentioned above elapses.

5) Stop

Used when the power is turned on and during the eject operation. In the stop mode, the voltage in both ends of the spindle motor is 0 V.

6) Rough servo

Used in carriage feed (carriage move mode such as long search).

By obtaining the linear velocity from the EFM waveform, the "H" or "L" level is input to the spindle equalizer. In the test mode, this mode is also used for grating confirmation.

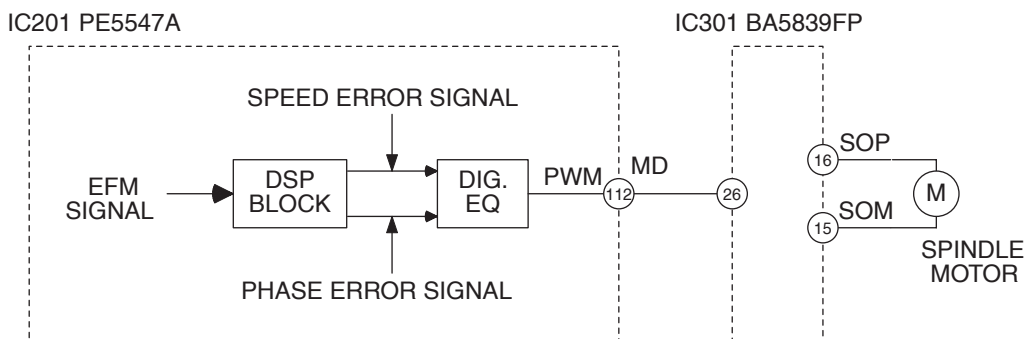


Fig.1.2.9 Block diagram of the spindle servo system

1.3 AUTOMATIC ADJUSTMENT FUNCTION

In this system, all the circuit adjustments are automated inside the CD of the LSI.

All adjustments are performed whenever a disc is inserted or the CD mode is selected by pressing the source key.

Details of each adjustment will be explained below.

1.3.1 TE, FE, and RF offset auto-adjustment

In this adjustment the TE, FE, and RF amplifier offsets of the preamplifier block in POWER ON are adjusted to the respective target values with the REFO as reference. (The target values for TE, FE, and RF offsets are 0 V, 0 V, and - 0.8 V, respectively.)

Adjusting procedure

1) The CPU of the LSI reads respective offsets through the CD of the LSI, when they are in LDOFF status.

2) The CPU of the LSI calculates the voltages for correction from the values read in 1), and substitutes the corrected values to prescribed places to adjust.

1.3.2 Tracking balance (T.BAL) auto-adjustment

This adjustment equalizes the output difference of the E-ch and F-ch from the pickup by changing the amplifier gain inside the CD of the LSI. In actual operation, adjustment is performed so that the TE waveform becomes symmetrical on each side of the REFO.

Adjusting procedure

1) After closing the focus loop,

2) Kick the lens in the radial direction to ensure the generation of the TE waveform.

3) The CPU of the LSI reads the offset amount of the TE signal calculated in the LSI at the time through the CD of the LSI.

4) The CPU of the LSI determines the offset amount is 0, positive, or negative.

- When the offset amount is 0, the adjustment is completed.

- When the offset amount is positive or negative, the amp gains for E-ch and F-ch should be changed, following a certain rule.

Then, steps 2) to 4) are repeated until the offset amount becomes 0 or the repetition reaches the limit number of times.

1.3.3 FE bias auto-adjustment

This adjustment is to maximize the RFO level by optimizing the focus point during the play mode, utilizing the phase difference between the 3T level waveform of the RF waveform and that of when focus error disturbance is input. This adjustment is performed at the same timing as the auto-gain control, which will be described later, since disturbance is input to the focus loop.

Adjusting procedure

1) The CPU of the LSI issues the command to introduce disturbance to the focus loop (inside the CD of the servo LSI).

2) The waver of the 3T component of the RF signal is detected in the CD of the LSI.

3) The relation between the 3T component above and the disturbance is processed inside the CD of the LSI to detect the volume and direction of the focus offset.

4) The CPU of the LSI issues a command and reads out the detected results from the CD of the LSI.

5) The CPU of the LSI calculates the necessary correction and substitutes the result to the bias adjustment term inside the CD of the LSI.

Additionally, in this adjusting, a series of steps are repeated for better adjustment accuracy, the same as in the auto-gain control.

1.3.4 Focus and tracking AGC

This adjustment is to automatically adjust the focus and tracking servo loop gains.

Adjusting procedure

- 1) Introduce disturbance to the servo loop.
- 2) The error signals (FE and TE) when disturbance is introduced are extracted through the band pass filter, to obtain the G1 and G2 signals.
- 3) The CPU of the LSI reads the G1 and G2 signals through the CD of the LSI.
- 4) The CPU of the LSI calculates the necessary correction and performs the loop gain adjustment inside the CD of the LSI.

For increased adjustment accuracy, the same adjustment process is repeated a few times.

1.3.5 RF level auto-adjustment (RFAGC)

This adjustment is to adjust the dispersion of the RF level (RFO), which may be caused by mechanism or disc-related factors, to a steady value for reliable signal transmission. The adjustment is performed by changing the amp gain between RFO and RFAGC.

Adjusting procedure

- 1) The CPU of the LSI issues a command and reads out the output from the RF level detection circuit inside the CD of the LSI.
- 2) From the read values, the CPU of the LSI calculates the amp gain to change the RFO level to the target.
- 3) The CPU of the LSI sends a command to the CD of the LSI to adjust the amp gain to the level calculated in 2).

This adjustment is performed

- 1) when only the focus close operation is completed during the setup mode, and
- 2) immediately before the setup is completed (or when the play mode is about to start).

1.3.6 Adjustment of gains in preamplifier stage

In this adjustment, when reflected beams from the disc surface are extremely weak, such as when the lens is dirty, or a CD-RW is played, gains in the whole RFAMP block (FE, TE, and RF amplifiers) are increased by + 6 dB or + 12 dB, depending on the situation.

Adjusting procedure

When the system determines that the reflected beams from the disc surface are extremely weak during the setup mode, the whole RFAMP gains will be increased by + 6 dB or + 12 dB.

1.3.7 Initial values in adjustment

All automatic adjustments immediately after inserting a disc are performed based on the initial values. Automatic adjustments by source change or ACC ON are basically performed using the previous adjustment values as the initial values.

1.3.8 Coefficient display of adjustment results

For some of the adjustments (FE and RF offset, FZD cancel, F and T gains, and RFAGC), the adjustment results can be displayed and confirmed in the test mode.

A The coefficient display in each auto adjustment is as follows:

1) FE and RF offset

Reference value = 32 (coefficient of 32 indicates that no adjustment is required)

The value is displayed in the unit of approximately 32 mV.

Ex. When the FE offset coefficient is 35,

$$35 - 32 = 3 \times 32 \text{ mV} = 96 \text{ mV}$$

The correction is about +96 mV, which means the FE offset before adjustment is - 96 mV.

2) F and T gain adjustment

Reference value for focus and tracking = 20

B The displayed coefficient / the reference value indicates the adjusted gain.

Ex. When the AGC coefficient is 40,

adjustment of $40 / 20 = 2$ times (+ 6 dB) has been performed.

(It means that the original loop gain was half the target, and the whole gain was doubled to obtain the target value.)

3) RF level adjustment (RFAGC)

Reference value = 8

The coefficient of 9 to 15 indicates to increase the RF level

(for more gains).

The coefficient of 7 to 10 indicates to decrease the RF level

(for less gains).

C When the coefficient changes by 1, the gain changes by 0.7 to 1 dB.

When the coefficient is 15, the gain is the maximum at TYP + 7.9 dB.

When the coefficient is 0, the gain is the minimum at TYP - 4.6 dB.

D

E

F

1.4 POWER SUPPLY AND LOADING BLOCK

For the power supply for this system, the VD (7.5 ± 0.5 V) and the VDD (3.3 ± 0.165 V), which are supplied from the motherboard, are used. The two power supplies, the VD mentioned above (for the drive system), and the VDD (for the LSI: 3.3 V), are used in this system.

The CPU of the LSI controls ON/OFF with "CONT", except for Load/Eject of the CD driver. For ON/OFF of the Loading drive, no particular control terminals are available, but the input signal "LOEJ" assumes an equivalent role. Also, the LCO output switches LOADING MODE and CARRIAGE MODE with "CLCONT".

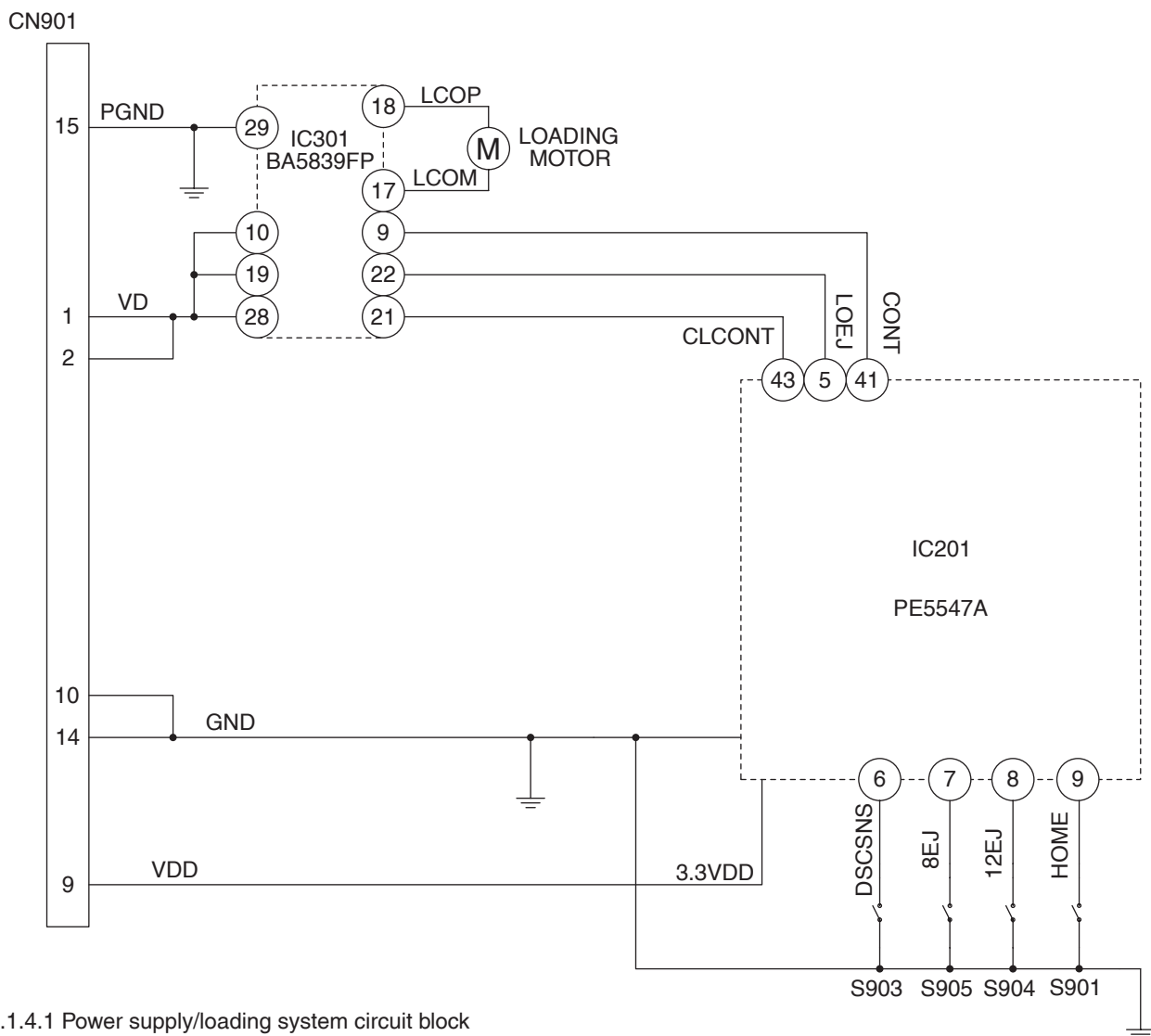


Fig.1.4.1 Power supply/loading system circuit block

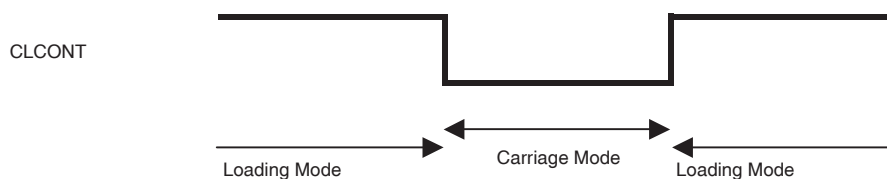


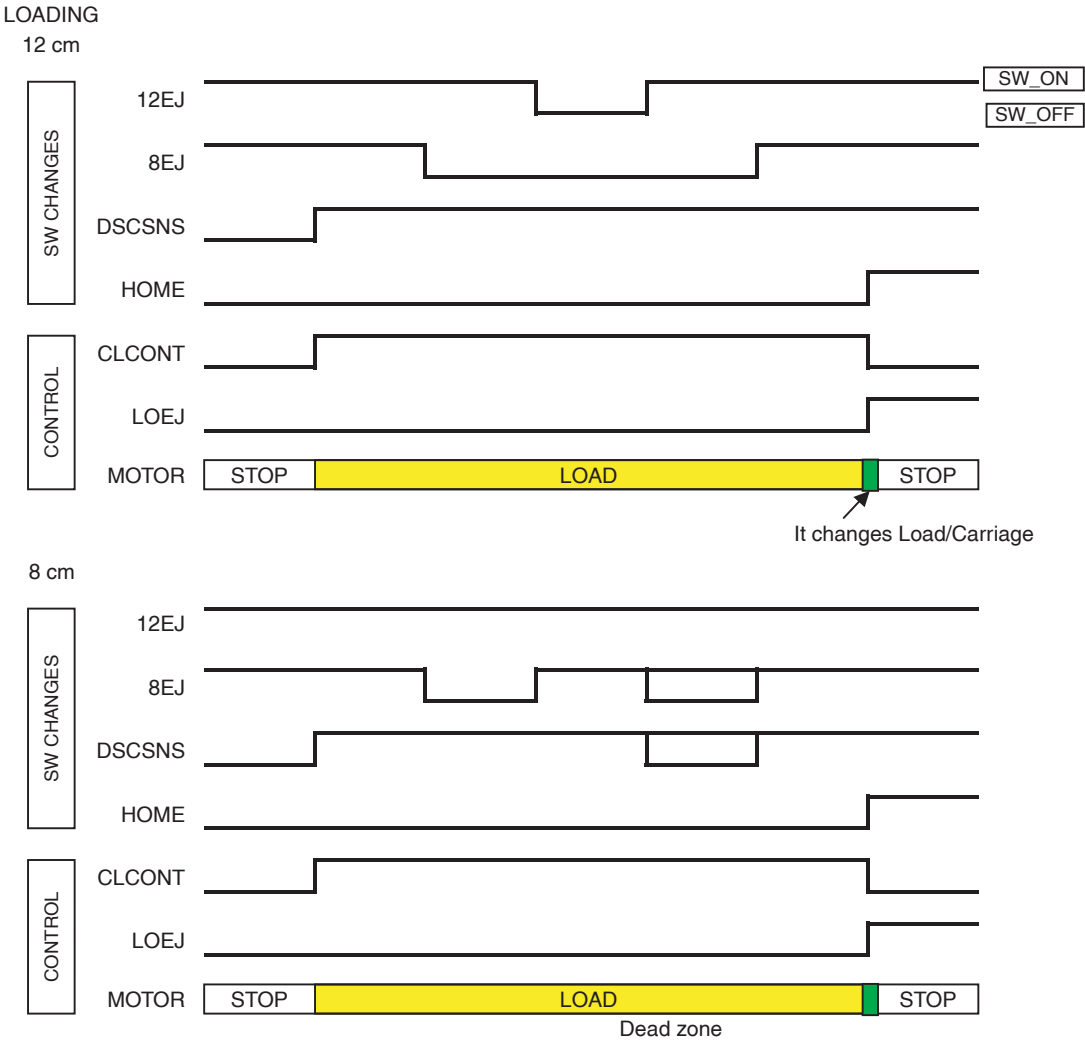
Fig.1.4.2 Loading/carriage mode shift

The load/eject operation is controlled with the status changes of the HOME switch (also used for clamp detection) on the mechanism unit and the three switches on the control unit. The ON/OFF statuses of these switches are respectively detected at the input port of the microcomputer.

Using the detection results in the microcomputer, each status (A to E) is determined. The disc size detection (8 or 12 cm) is also performed through this status change. Each status is shown in Fig.1.4.3 and the status change in Fig.1.4.4.

Status	A	B	C	D	E
DSCSNS	OFF	ON	ON	ON	ON
8SW	ON	ON	OFF	OFF	ON
12SW	ON	ON	ON	OFF	ON
HOME	OFF	OFF	OFF	OFF	ON
Mechanism state	With no disc				Clamp state

Fig.1.4.3 DSCSNS status



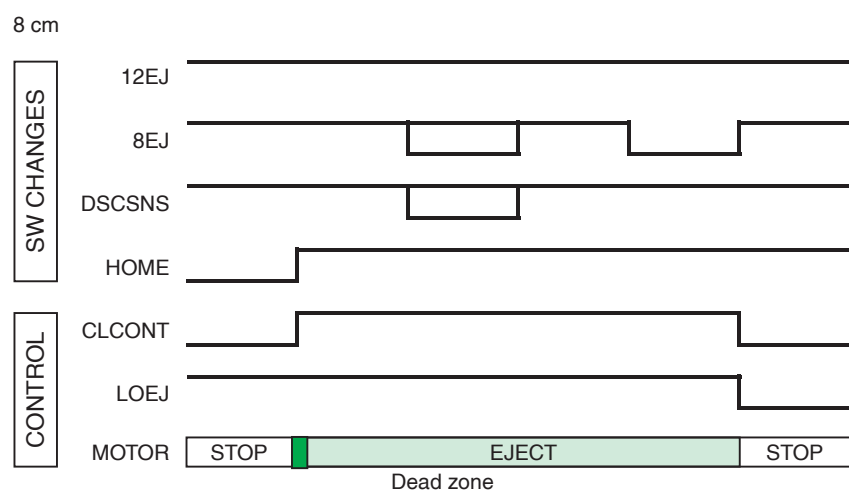
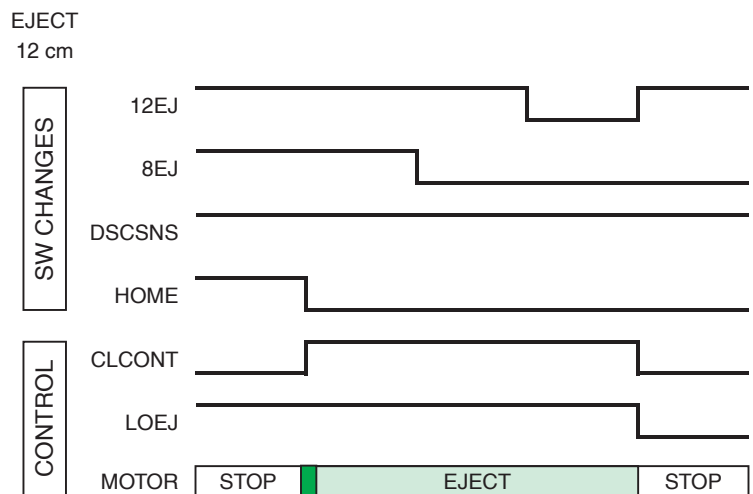


Fig.1.4.4 Status change in LOAD and EJECT modes

2. MECHANISM DESCRIPTIONS

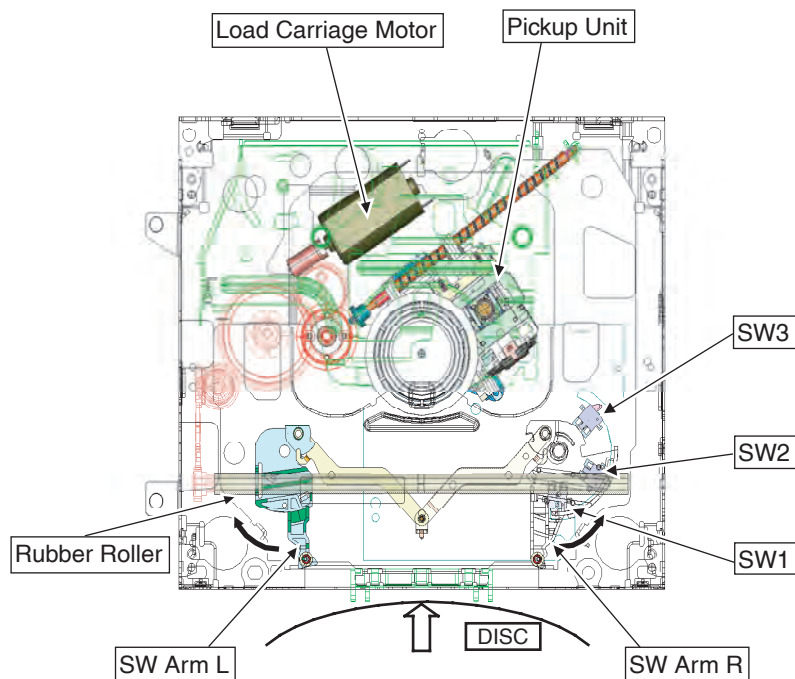
● Loading actions

1. When a disc is inserted, SW Arm L and R rotate and SW1 is switched from ON to OFF.

When SW1 is switched from ON to OFF, the Load Carriage Motor is started and the rubber roller rotates.

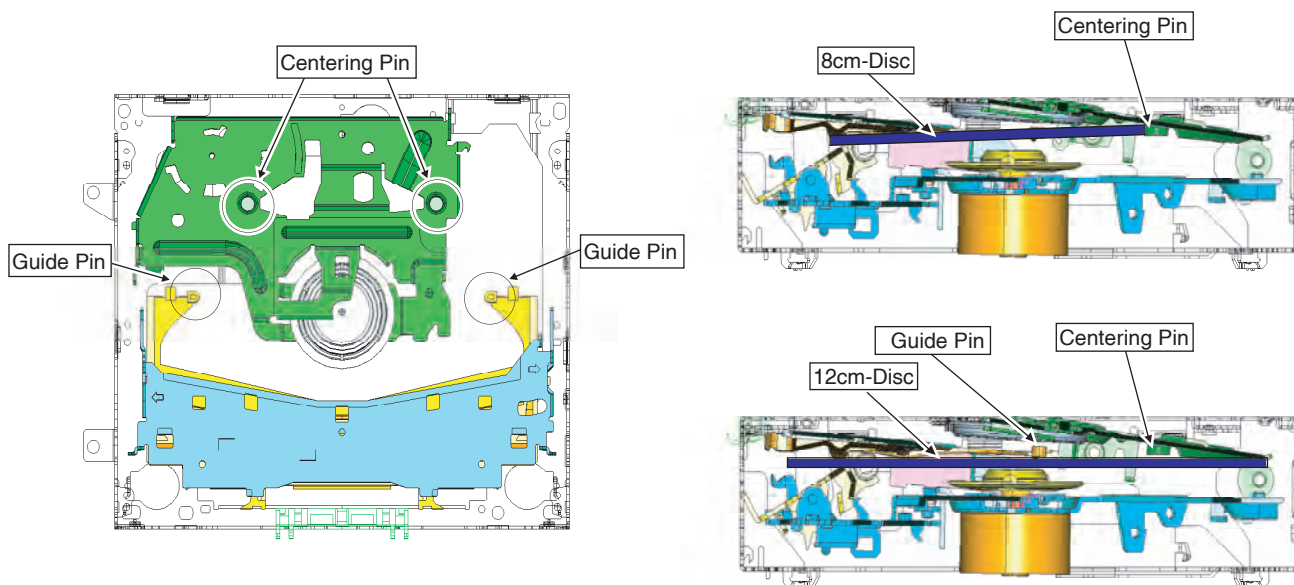
2. If the disc is a 12cm-disc, SW3 is turned ON with SW Arm, and the microcomputer determines that the disc is a 12cm-disc.
3. In case of an 8cm-disc, SW3 is not turned ON, a clamp action is triggered, and the microcomputer determines that the disc is an 8cm-disc.

(The left and right of SW Arm are coupled, and when only one side is pushed, the coupled joint will lock, and the arms will not open more than a certain width (SW3 will not be turned ON).)



● Disc centering mechanism

1. 8cm-disc is centered by the Guide Pins and the Centering Pins.
2. 12cm-disc passes under the Guide Pins and the Centering Pins, and is centered in the back position of the mechanism.



● Clamp actions mechanism

1. With an 8 or 12cm-disc centered on the spindle, the Detection Arm is moved.

2. The movement of the Detection Arm engages the Loading Rack with the 2-Stage Gear.

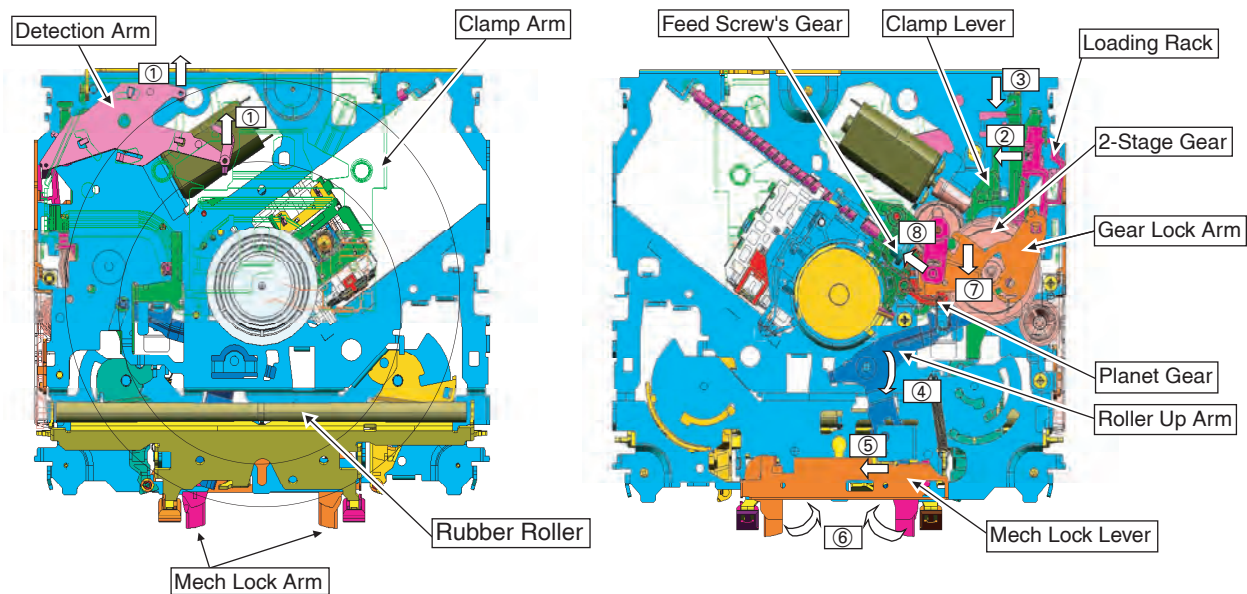
3. The Clamp Lever slides and lowers the Clamp Arm (the disc is clamped).

At the same time, the Roller Up Arm is rotated, and the Rubber Roller is separated from the disc.

Also the arm slides the Mechanical Lock Lever, turns the Mechanical Lock Arm, and releases the mechanical lock, completing the clamp operation.

4. When the clamp action is completed, the Clamp Lever rotates the Gear Lock Arm.

When the arm is rotated, the Planet Gear is separated from the 2-Stage Gear and engaged with the gear of the pickup feed screw, and the carriage operation will start



● Eject actions

1. When the Load Carriage Motor is rotated backward, and the pickup is fed to the inner periphery passing the home SW ON point, the eject action will start in the reverse order of the procedure mentioned earlier.

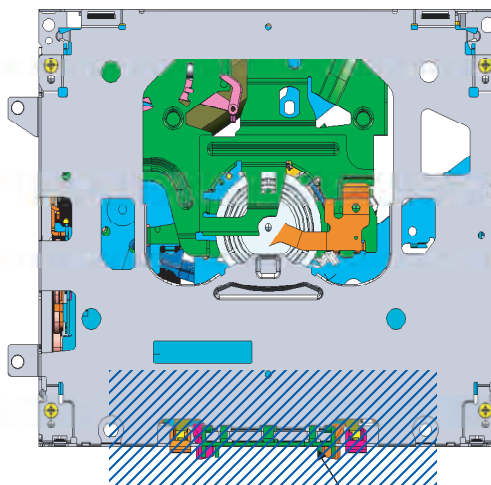
2. For a 12cm-disc, Eject is completed when SW3 is switched OFF, ON, and OFF again.

3. For an 8cm-disc, Eject is completed when SW2 is switched OFF, ON, and OFF again.

3. DISASSEMBLY

● How to hold the Mechanism Unit

1. Hold the Upper and Lower Frames.
2. Do not hold the front portion of the Upper Frame, because it is not very solid.

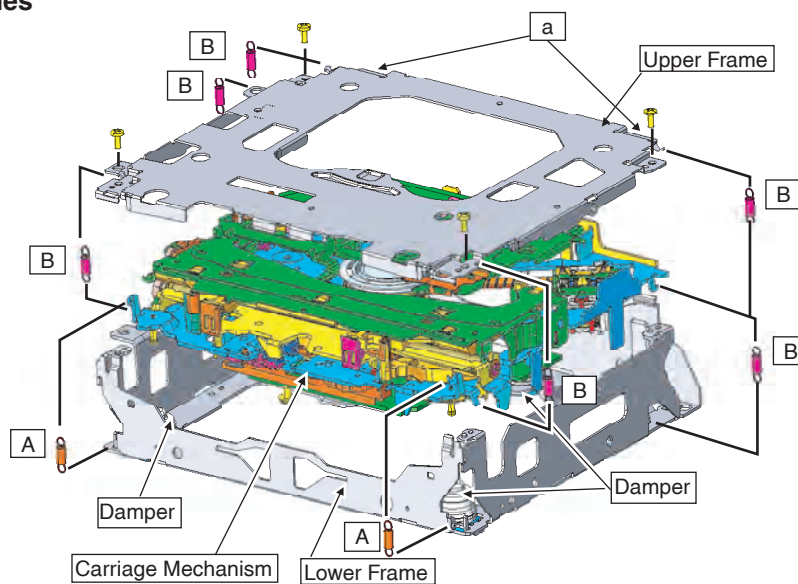


Do not squeeze this area.

● Removing the Upper and Lower Frames

1. With a disc inserted and clamped in the mechanism, remove the two Springs (A), the six Springs (B), and the four Screws.
2. Turn the Upper Frame using the part "a" as a pivot, and remove the Upper Frame.
3. While lifting the Carriage Mechanism, remove it from the three Dampers.

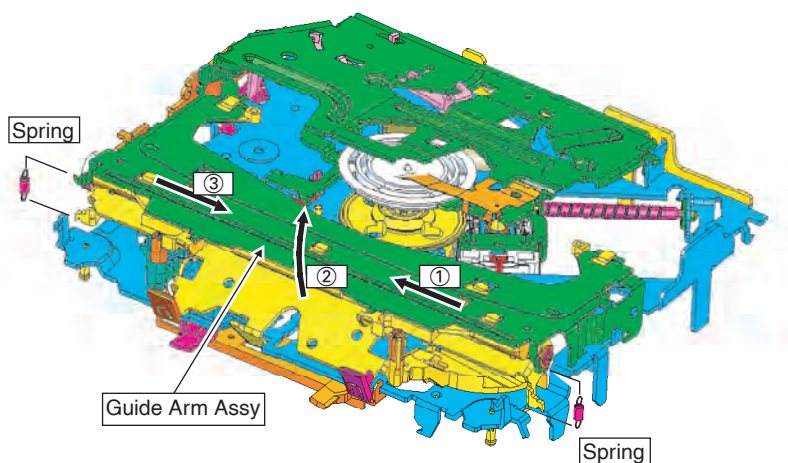
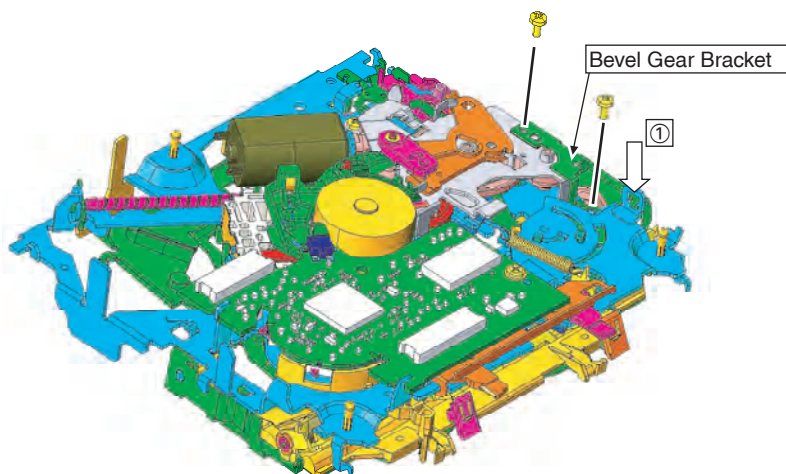
Caution: When assembling, be sure to apply some alcohol to the Dampers and assemble the mechanism in a clamped state.



● Removing the Guide Arm Assy

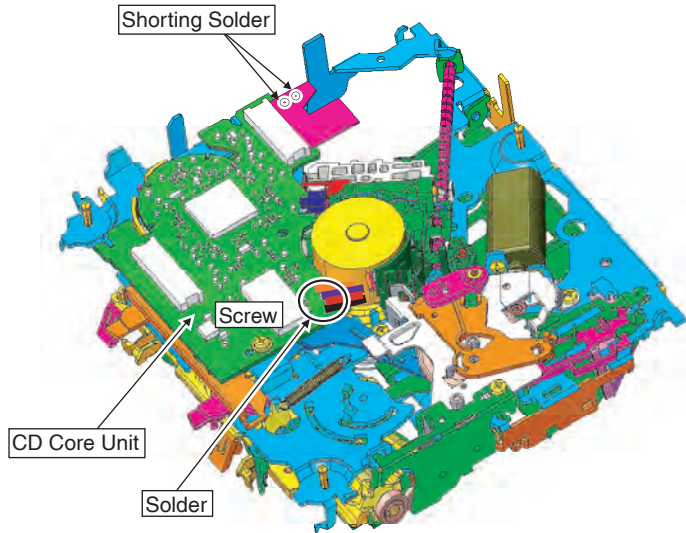
1. Remove the Upper and Lower Frames and set the mechanism to the eject mode.
2. Remove the two Screws and Bevel Gear Bracket. (Note that the gears will come off.)
3. Remove the two Springs from the left and right sides.
4. Slide the Guide Arm Assy to the left, and turn it upward.
5. When it is turned about 45 degrees, slide it to the right and remove.

Caution: When assembling, assemble with the Bevel Gear Bracket moved to the direction of the arrow (①).



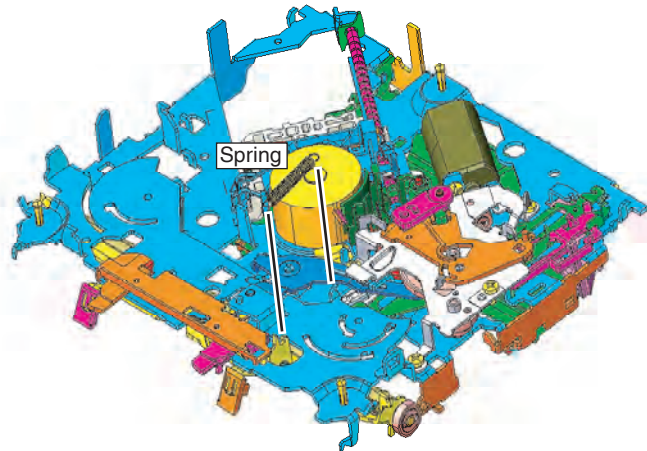
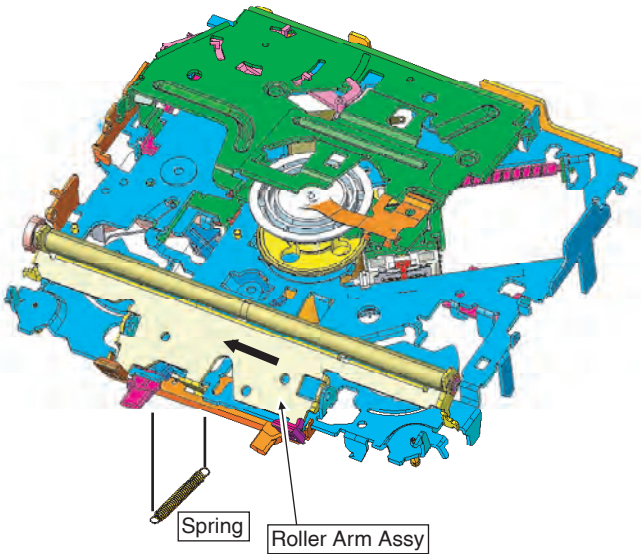
● How to remove the CD Core Unit

1. Apply Shorting Solder to the flexible cable of the Pickup, and disconnect it from the connector.
 2. Unsolder the four leads, and loosen the Screw.
 3. Remove the CD Core Unit.
- Caution: When assembling the CD Core Unit, assemble it with the SW in a clamped state so as not to damage it.



● How to remove the Roller Arm Assy

1. Remove the Guide Arm Assy.
2. Remove the CD Core Unit. (If the Spring can be removed, the unit need not be removed, depending on the type of CD Core Unit.)
3. Remove the Spring.
4. Slide the Roller Arm Assy to the left.

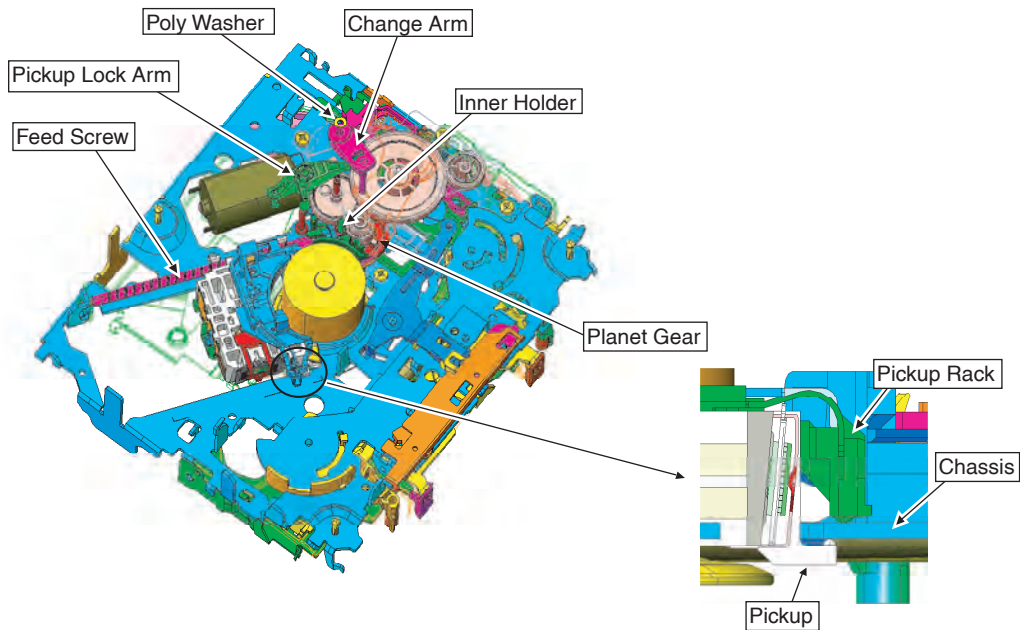


● How to remove the Pickup Unit

1. Make the system in the carriage mechanism mode, and have it clamped.
2. Remove the CD Core Unit and remove the leads from the Inner Holder.
3. Remove the Poly Washer, Change Arm, and Pickup Lock Arm.
4. While releasing from the hook of the Inner Holder, lift the end of the Feed Screw.

Caution: When assembling, move the Planet Gear to the load/eject position before setting the Feed Screw in the Inner Holder.

Assemble the sub unit side of the Pickup, taking the plate (Chassis) in-between. When treating the leads of the Load Carriage Motor Assy, do not make them loose over the Feed Screw.

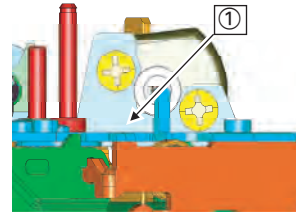
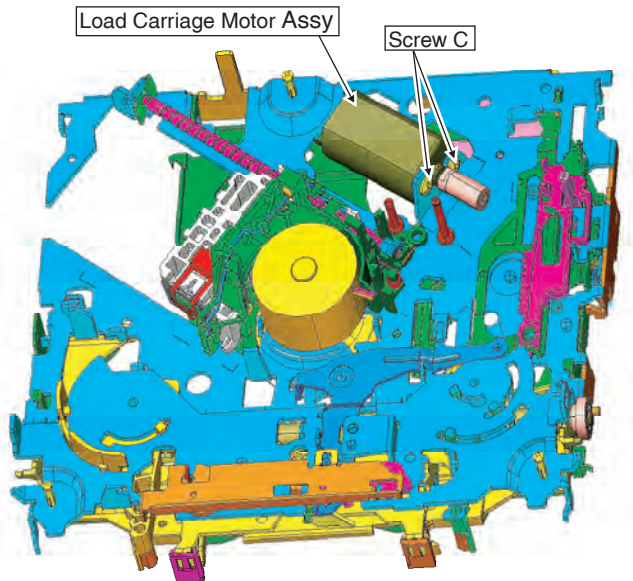
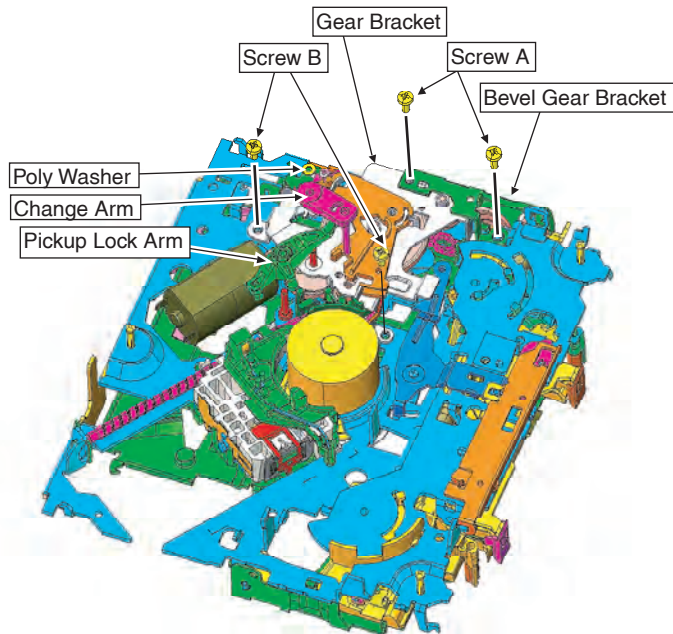


● How to remove the Load Carriage Motor Assy

1. Make the system in the carriage mechanism mode, and have it clamped.
2. Release the leads (orange and purple) of Load Carriage Motor Assy from the CD Core Unit and remove the holder.
3. Remove the Poly Washer, Change Arm, and Pickup Lock Arm.
4. Remove the two Screws (A) and the Bevel Gear Bracket (Note that the gears will come off).
5. Remove the two Screws (B) and the Gear Bracket (remove the CD Core Unit, if necessary), and remove all the gears.
6. Remove the two Screws (C) and the Load Carriage Motor Assy.

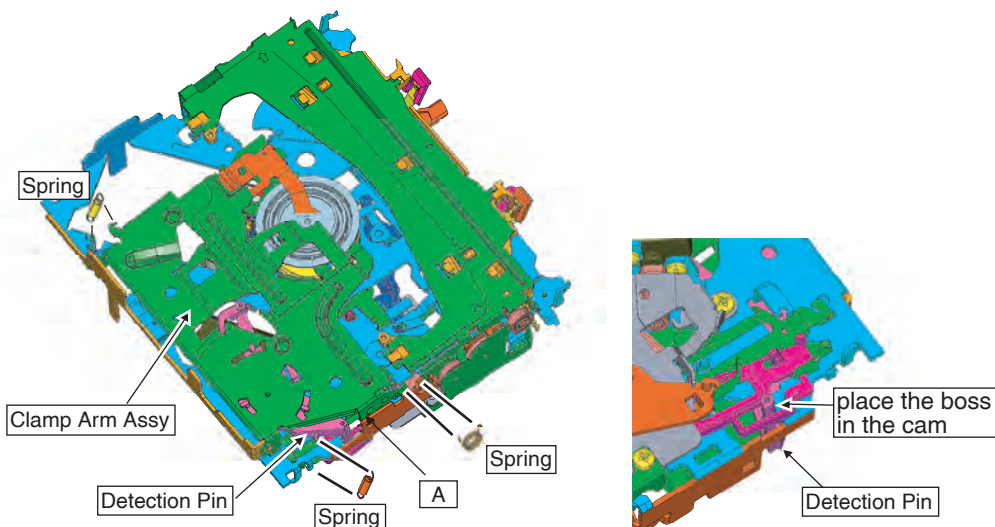
Caution: When assembling the Load Carriage Motor Assy, move it to the direction shown in the illustration (①).

When treating the leads of the Load Carriage Motor Assy, do not make them loose over the Feed Screw.



● How to remove the Clamp Arm Assy

1. Make the system in the carriage mechanism mode, and set the mechanism to the eject mode.
 2. Remove the three Springs.
 3. While pressing the position A, turn the Clamp Arm Assy upward, slide it to the left, and remove.
- Caution: When assembling, place the boss of the Detection Pin in the cam unit of the Loading Rack.



● How to remove the Spindle Motor Assy

1. Make the system in the carriage mechanism mode, and have it clamped.
2. Remove the CD Core Unit and remove the leads from the Inner Holder.
3. Set the mechanism to the eject mode and remove the Clamp Arm Assy.
4. Set the mechanism to the clamped and move the Pickup to circumference.
5. Remove the two Screws, and remove the Spindle Motor Assy.

